



03/01/99

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT TRANSMITTAL FORM

Applicant: Gregory J. Battersby, et al.

Docket No.: RUS013USU

Serial No.: TBA

Filed: March 1, 1999

For: BALL-THROWING MACHINE

BOX PATENT APPLICATION
THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:

Transmitted herewith is:

1. Utility Patent Application including specification (33 pages), claims (9 pages, Nos. 1-30) & abstract
2. Informal Drawings (10 pages, FIGS. 1-1)
3. Declaration and Power of Attorney
4. Assignment with Cover Sheet
5. Our firm's check nos. 13867 in the amount of \$ 603.00
6. Postcard
7. Duplicate copy of this letter
8. New Application Transmittal

Please charge any additional fees or credit any such fees, if necessary to Deposit Account No. 07-2162 in the name of Grimes & Battersby. A duplicate copy of this sheet is attached.

Respectfully submitted,

James G. Coplit
Reg. No. 40,571
Grimes & Battersby
P.O. Box 1311
Three Landmark Square, Suite 405
Stamford, Connecticut 06904-1311
(203) 324-2828Date: March 1, 1999

CERTIFICATE OF EXPRESS MAILING

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS EXPRESS MAIL, POST OFFICE TO ADDRESSEE, CERTIFICATE NO. EM394896692US IN AN ENVELOPE ADDRESSED TO: COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231, ON March 1, 1999.

JAMES G. COPLIT
NAME OF REGISTERED
REPRESENTATIVE

SIGNATURE

3/1/99
DATE

JC490 U.S. PTO
03/01/99

PATENT

Docket No. RUS013USU

Box Patent Application

Commissioner of Patents and Trademarks

Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): **Gregory J. Battersby, James Cobb, Charles W. Grimes, Richard D. Schile
and Steven van Geldern**

WARNING: Patent must be applied for in the name(s) of all of the actual inventor(s). 37 CFR 1.41(a) and 1.53(b).

For (title): **BALL-THROWING MACHINE**

1. Type of Application

This new application is for a(n) (check one applicable item below):

- ☒ Original
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4) unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

NOTE: If one of the following 3 items apply then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional
☐ Continuation
☐ Continuation-in-part (CIP)

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date March 1, 1999 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EM394896692US addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

James G. Coplit

(Type or print name of person mailing paper)

(Signature of person mailing paper)

NOTE: Each paper or fee referred to as enclosed herein has the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 CFR 1.10(b).

2. Benefit of Prior U.S. Application(s) (35 USC 120)

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s) and enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed Which Are Required For Filing Date Under 37 CFR 1.53(b) (Regular) or 37 CFR 1.153 (Design) Application

- 33 Pages of specification
9 Pages of claims (Nos. 1-30)
1 Pages of Abstract
10 Sheets of drawing (Figs. 1-11)

☐ formal

☒ informal

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. **Only one copy is required or desired.** Comments on proposed new 37 CFR 1.84. Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia such as the serial number, group and unit, title of the invention, attorney's docket number, inventor's name, number of sheets, etc., not to exceed 2 3/4 inches (7.0 cm.) in width may be placed in a centered location between the side edges within three fourths inch (19.1 mm.) of the top edge. Either this marking technique on the front of the drawing or the placement, although not preferred, of this information and the title of the invention on the back of the drawings is acceptable." Proposed 37 CFR 1.84(1). Notice of March 9, 1988 (1090 O.G. 57-62).

4. Additional papers enclosed

- ☐ Preliminary Amendment
☐ Information Disclosure Statement (37 CFR 1.98)
☐ Form PTO-1449
☐ Citations
☐ Declaration of Biological Deposit
☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
☐ Special Comments
☐ Other

5. Declaration or oath

☒ Enclosed

executed by (check all applicable boxes)

☒ inventor(s).

☐ legal representative of inventor(s). 37 CFR 1.42 or 1.43

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ this is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

WARNING: Where the filing is a completion in the U.S. of an International Application but where a declaration is not available or where the completion of the U.S. application contains subject matter in addition to the International Application the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED

☐ Application is made by a person authorized under 37 CFR 1.41(c) on behalf of all the above named inventor(s). (The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently)

NOTE: It is important that all the correct inventor(s) are named for filing under 37 CFR 1.41(c) and 1.53(b)

☐ Showing that the filing is authorized. (Not required unless called into question. 37 CFR 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☒ The same

or

☐ Are not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. A verified English translation of the non-English language application and the processing fee of \$130.00 required by 37 CFR 1.17(k) is required to be filed with the application or within such time as may be set by the Office. 37 CFR 1.52(d).

NOTE: A non-English oath or declaration in the form provided or approved by the PTO need not be translated. 37 CFR 1.69(b).

☒ English

☐ non-English

☐ the attached translation is a verified translation. 37 CFR 1.52(d).

(Application Transmittal [4-1]—page 3 of 7)

8. Assignment

☒ An assignment of the invention to Kent Communications, Ltd.

☒ is attached. A separate ☒ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1906 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

9. Certified Copy

Certified copy(ies) of application(s)

(country)	(appln. no.)	(filed)
(country)	(appln. no.)	(filed)
(country)	(appln. no.)	(filed)

from which priority is claimed

☐ is(are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 CFR 1.16)

A. ☒ Regular application

CLAIMS AS FILED				
Number filed	Number Extra	Rate	Basic Fee 37 CFR 1.16(a)	
			\$710.00	\$760.00
Total Claims (37 CFR 1.16(c)) 23 -20=	3	X	18 \$ 22.00	\$54.00
Independent Claims (37 CFR 1.16(b)) 7 -3=	4	X	78 \$ 74.00	\$312.00
Multiple dependent claim(s), if any (37 CFR 1.16(d))			\$230.00	

☐ Amendment cancelling extra claims enclosed.

☐ Amendment deleting multiple-dependencies enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation

\$ 1126.00

B. ☐ **Design application**

(\$280.00—37 CFR 1.16(f))

Filing Fee Calculation

\$ _____

C. ☐ **Plant application**

(\$460.00—37 CFR 1.16(g))

Filing fee calculation

\$ _____

11. **Small Entity Statement(s)**

- ☒ Verified Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is(are) attached.

Filing Fee Calculation (50% of A, B or C above)

\$ 563.00

NOTE: Any excess of the full fee paid will be refunded if a verified statement and a refund request are filed within 2 months of the date of timely payment of a full fee. 37 CFR 1.28(a).

12. **Request for International-Type Search (37 CFR 1.104(d))** (complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. **Fee Payment Being Made At This Time**

- ☐ Not Enclosed

- ☐ No filing fee is to be paid at this time. (This and the surcharge required by 37 CFR 1.16(e) can be paid subsequently.)

- ☒ Enclosed

☒ basic filing fee \$ 563.00

☒ recording assignment (\$40.00; 37 CFR 1.21(h)) \$ 40.00

☐ petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached. (\$130.00; 37 CFR 1.47 and 1.17(h)) \$ _____

☐ for processing an application with a specification in a non-English language. (\$130.00; 37 CFR 1.52(d) and 1.17(k)) \$ _____

☐ processing and retention fee (\$130.00; 37 CFR 1.53(d) and 1.21(l)) \$ _____

☐ fee for international-type search report (\$35.00; 37 CFR 1.21(e)). \$ _____

NOTE: 37 CFR 1.21(l) establishes a fee for processing and retaining any application which is abandoned for failing to complete the application pursuant to 37 CFR 1.53(d) and this, as well as the changes to 37 CFR 1.53 and 1.78, indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid or the processing and retention fee of § 1.21(l) must be paid within 1 year from notification under § 53(d).

Total fees enclosed

\$ 603.00

14. Method of Payment of Fees

- ☒ Check in the amount of \$ 603.00
- ☐ Charge Account No. _____ in the amount of \$ _____. A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing the following items should **not** be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 07-2162.

- ☒ 37 CFR 1.16(a), (f) or (g) (filing fees)
- ☐ 37 CFR 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

- ☒ 37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
- ☒ 37 CFR 1.17 (application processing fees)

WARNING: While 37 CFR 1.17(a), (b), (c) and (d) deal with extensions of time under § 1.136(a) this authorization should be made only with the knowledge that: "Submission of the appropriate extension fee under 37 C.F.R. 1.136(a) is to no avail unless a request or petition for extension is filed." (Emphasis added). Notice of November 5, 1985 (1060 O.G. 27).

- ☐ 37 CFR 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 CFR 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b).

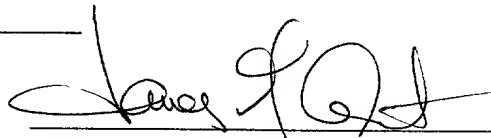
NOTE: 37 CFR 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . issue fee". From the wording of 37 CFR 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions As To Overpayment

- ☐ credit Account No. _____
- ☒ refund

Reg. No. **40,571**

Tel. No. (203) 324-2828



SIGNATURE OF ATTORNEY

James G. Coplit

Type or print name of attorney

P.O. Box 1311

P.O. Address

Stamford, CT 06904-1311

☒ **Incorporation by reference of added pages**

Check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED

- ☐ Plus Added Pages For New Application Transmittal Where Benefit Of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages For Papers Referred To In Item 4 Above

Number of pages added _____

- ☒ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added 3

☐ **Statement Where No Further Pages Added**

(If no further pages form a part of this Transmittal then end this Transmittal with this page and check the following item)

- ☐ This transmittal ends with this page.

Applicant(s): Gregory J. Battersby, James Cobb, Charles W. Grimes, Richard D. Schile, and Steve Van Geldern
Serial or Patent No.: TBA Docket No.: RUS013USU
Filed or Issued: TBA
For: BALL-THROWING MACHINE

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (b) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled BALL-THROWING MACHINE described in

☒ the specification filed herewith
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

I have not assigned, granted, conveyed or licensed any am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:


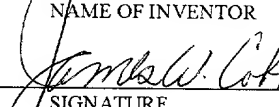

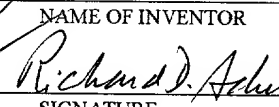
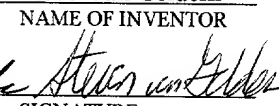
☐ no such person, concern, or organization
☒ persons, concern or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Kent Communications, Ltd.
ADDRESS P.O. Box 1169, Stamford, Connecticut 06904-1169
☐ INDIVIDUAL ☒ SMALL BUSINESS CONCERN ☐ NON PROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

<u>Gregory J. Battersby</u>	<u>James Cobb</u>	<u>Charles W. Grimes</u>	<u>Richard D. Schile</u>	<u>Steve Van Geldern</u>
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
				
SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
<u>Feb 25, 1999</u>	<u>Feb 23, 1999</u>	<u>2/23/99</u>	<u>Feb. 23, 1999</u>	<u>3/1/99</u>
DATE	DATE	DATE	DATE	DATE

<u>25 Poplar Plain Road</u>	<u>70 South Broadway</u>	<u>55 Allwood Road</u>	<u>22 Bloomer Road</u>	<u>5 Covewood Drive</u>
<u>Westport, CT 06880</u>	<u>Tarrytown, NY 10591</u>	<u>Darien, CT 06820</u>	<u>Ridgefield, CT 06877</u>	<u>Rowayton, CT 06853</u>
ADDRESS OF INVENTOR	ADDRESS OF INVENTOR	ADDRESS OF INVENTOR	ADDRESS OF INVENTOR	ADDRESS OF INVENTOR

Applicant(s): Gregory J. Battersby, James Cobb, Charles W. Grimes, Richard D. Schile, and Steve Van Geldern
Serial or Patent No.: TBA Docket No.: RUS013USU
Filed or Issued: TBA
For: BALL-THROWING MACHINE

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9 (f) and 1.27 (c) - SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Kent Communications, Ltd.
ADDRESS OF CONCERN P.O. Box 1169, Stamford, Connecticut 06904-1169

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9 (d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party of parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled BALL-THROWING MACHINE by inventor (s) Gregory J. Battersby, James Cobb, Charles W. Grimes, Richard D. Schile and Steve Van Geldern described in

- ☒ the specification filed herewith
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below * and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9 (d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

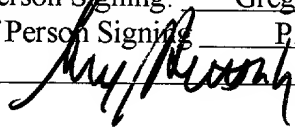
*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME _____ ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NON PROFIT ORGANIZATION

NAME _____ ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NON PROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed

Name Of Person Signing: Gregory J. Battersby Title Of Person Other Than Owner President
Address Of Person Signing P.O. Box 1169, Stamford, CT 06905-1169
Signature  Date 3/1/99

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

PATENT APPLICATION

of

GREGORY J. BATTERSBY

and

JAMES COBB

and

CHARLES W. GRIMES

and

RICHARD D. SCHILE, PhD

and

STEVEN VAN GELDERN

for

BALL-THROWING MACHINE

Attorneys:

Grimes & Battersby
P.O. Box 1311
3 Landmark Square
Stamford, CT 06904-1311
(203) 324-2828
Our File No.: RUS013USU

03/01/99

TITLE: BALL-THROWING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a ball-throwing machine and, more particularly, to such a machine that is adapted to pitch baseballs and softballs and throw tennis and other balls interchangeably to different locations and at different speeds and with different spins. The invention has particular applicability as a baseball pitching machine that is able to interchangeably deliver a variety of pitches (i.e., fastballs, curveballs, changeups, etc.) at different speeds to different locations without the need for manually readjusting or repositioning the machine between pitches.

2. Description of the Prior Art

Pitching machines and ball-throwing machines are well-known in the art and generally fall into four categories: (1) machines that employ a spring actuated arm mechanism to propel the ball; (2) machines that employ at least one rotating wheel or a pair of rotating, coacting wheels to propel the ball; (3) machines that rely on pneumatic pressure to propel the ball; and (4) machines that employ converging and diverging rotatable discs to propel the ball.

Examples of ball-throwing machines that employ a spring mechanism to propel the ball are described, for example, in U.S. Patent No. 3,757,759 which issued on September 11, 1973 to J.G. Haworth for Automatically Varied Oscillation Type Ball Projecting Device and U.S. Patent No. 4,524,749 which issued on June 25, 1985 to Paul S. Giovagnoli for Spring-Type Ball Pitching Machine. Commercial versions of such a machine have been marketed by Master Pitching

Machine of Kansas City, MO.

In recent years, the majority of the commercially available ball-throwing or pitching machines employ one or two coacting rotating wheels which are used to propel a ball that is introduced into the nip between the rotating wheels or between a plate and a single rotating wheel. Examples of such machines are described in U.S. Patent No. 3,724,437 which issued on April 3, 1973 to E.W. Halstead for Ball-throwing Machine; U.S. Patent No. 3,815,567 which issued on June 11, 1974 to Norman S. Serra for Coacting Wheel Ball Projecting Device; U.S. Patent No. 4,197,827 which issued to Tommy L. Smith on April 15, 1980 for Coacting Wheel Ball Projecting Device; U.S. Patent No. 4,423,717 which issued to Edward W. Kahelin on January 3, 1984 for Variable Double Wheel Ball Propelling Machine; U.S. Patent No. 4,583,514 which issued to Fujio Nozato on April 22, 1986 for a Ball-throwing Machine; and U.S. Patent No. 4,922,885 which issued to Shigery Iwabuchi et al. on May 8, 1990 for a Pitching Machine. Commercial machines that employ a pair of rotating coacting wheels are marketed by The Jugs Company of Tualatin, Oregon, ATEC of Sparks, Nevada, AAI American Athletic, Inc. of Jefferson, Iowa, K-Lin Specialties, Inc. of Huntington Beach, California and OMNI Sports Technologies of Kansas City, MO.

Machines that utilize a pair of coacting wheels are able to deliver a variety of different pitches, e.g., fastball, curve ball, screwball, etc. at a variety of different speeds. Changes in the pitch speed or pitch type are accomplished by varying the speed of the individual wheels and the angle of presentation relative to a horizontal and/or vertical plane. The ability of such machines to deliver different pitches is described, for example, in U.S. Patent No. 3,288,127 which issued on

November 29, 1966 to J.C. Bullock for Baseball Pitching Machine with Ball Curving Device; U.S. Patent No. 3,604,409 which issued to Ralph W. Doeg on September 14, 1971 for Ball Projecting Machine with Direction Control Mechanism; U.S. Patent No. 3,724,437 which issued on April 3, 1973 to Earle W. Halstead for Ball-throwing Machine; U.S. Patent No. 4,323,047 which issued on April 6, 1982 to James K. McIntosh et al. for Automatic Ball Pitching Machine; U.S. Patent No. 4,372,284 which issued to James A. Shannon et al. on February 8, 1983 for Baseball-Pitching Machine; U.S. Patent No. 4,655,190 which issued to Clifford V. Harris on April 7, 1987 for Ball Pitching Machine with Selective Adjustment Between Drive and Pressure Wheels.

While rotating wheel machines are capable of varying the speed of the pitch and the type of the pitch, an inherent problem with such machines, however, is that they require extensive adjustments and realignment of the machine in order to change from one pitch to another or from one location to another. For example, if a coach seeks to change the pitch to be delivered by the machine from a 90MPH fastball to a 75 MPH curve ball or from a fastball in one position in the strike zone to a fastball in another position, the coach must manually readjust the wheel speeds, reposition the angle of the wheels relative to a vertical and/or horizontal plane, and manually realign the horizontal and vertical position of the machine. It can take as long as five minutes to accomplish these changes before the machine is properly re-positioned to be able to deliver the next pitch. As a result, coaches tend to use these machines to deliver a series of the same pitch to the same location rather than attempting to interchangeably deliver different pitches to different locations as a pitcher would do in an actual game. Accordingly, these machines are of only marginal value in attempting to prepare a batter for game conditions. Such machines frequently

give the hitter a false sense of security, e.g., believing that because they can hit the same pitch delivered repeatedly at the same speed to the same location they will succeed in actual game conditions.

Others have recognized this problem and incorporated devices in such machines to permit adjustment of both the horizontal and vertical position of such machines. See, for example, U.S. Patent No. 5,174,565 which issued on December 29, 1992 to Yutaka Komori for Baseball Pitching Machine; U.S. Patent No. 5,344,137 which issued on September 6, 1994 to Yutaka Komori for Method for Improving the Accuracy of a Baseball Pitching Machine; U.S. Patent No. 5,359,986 which issued on November 1, 1994 to Earl K. McGrath et al. for Pitching Machine and Method; and U.S. Patent No. 5,437,261 which issued on August 1, 1995 to Kerry K. Paulson et al. for Ball Pitching Device. While permitting minor adjustments for both horizontal and vertical position to accommodate for slight changes in pitch speed, none of these patents permit rapid changing of pitch type, i.e., fast ball to curve ball, etc. Such change would only be accomplished by a major re-positioning and re-adjusting the rotational velocity of the two coacting wheels.

Attempts have been made to use three coacting rotating wheels in a pitching machine to permit the delivery of different types of pitches without the need for repositioning the machine between pitches. U.S. Patent No. 5,649,523 which issued on July 22, 1997 to Jack C. Scott for Ball-throwing Apparatus and U.S. Patent No. 4,442,823 which issued to Johnnie E. Floyd on April 17, 1984 for Ball-throwing Machine and System Having Three Individually Controllable Wheel Speeds and Angles describe two such attempts. The machines described in these patents are not commercial, however, due, in large measure, to their failure to precisely control the

horizontal and vertical positioning of the machine. Moreover, they both fail to carefully consider and control the forces of the three coacting wheels on the ball in order to consistently deliver a variety of different pitches with the accuracy and precision required.

Granada Pitching Machines of Central Point, Oregon recently introduced a three-wheel pitching machine that incorporates limited controls over the individual wheel speeds. The machine, known as the Triton G-2000, fails to provide for horizontal and vertical adjustments of the aiming point and, as such, is incapable of delivering a plurality of different pitches at different speeds and locations on an interchangeable basis.

The concept of programming a pitching machine to deliver a variety of different pitches has been discussed in prior patents, most notably in U.S. Patent No. 5,125,653 which issued to Ferenc Kovacs et al. on June 30, 1992 for Computer Controller Ball-throwing Machine and U.S. Patent No. 5,464,208 which issued on November 7, 1995 to Richard A. Pierce for Programmable Baseball Pitching. Such machines are of the two-wheel type and are incapable of rapid change in order to interchangeably deliver a variety of different pitches. Accordingly, the degree of programming offered by these devices is minimal, at best.

The marriage of a ball-throwing machine with a video display of a pitcher is described in U.S. Patent No. 5,195,744 which issued on March 23, 1993 to Neil S. Kapp et al. for Baseball Batting Practice Apparatus with Control Means. Such device, however, fails to offer the unique advantages of delivering a variety of different pitches as contemplated by the present invention.

SUMMARY OF THE INVENTION

Against the foregoing background, it is a primary object of the present invention to provide a ball-throwing machine that can be used to interchangeably throw a variety of different types of balls including baseballs, softballs, tennis balls and the like with less than ten second intervals between throws.

It is another object of the present invention to provide such a ball-throwing machine that is able to interchangeably deliver a variety of different pitches to a variety of different locations at a variety of different speeds without the need to manually readjust the machine between pitches.

It is yet another object of the present invention to provide such a ball-throwing machine that is able to deliver such pitches without the need for manual adjustment of the machine.

It is another object of the present invention to provide such a ball-throwing machine that allows a user to select the type, speed and location of each pitch or, alternatively, can be programmed to deliver a variety of pitches in a pre-determined or random manner.

It is still yet another object of the present invention to provide such a ball-throwing machine in which the controls for such machine can be easily reprogrammed to simulate a pre-determined or random pitch pattern.

It is yet another object of the present invention to provide such a ball-throwing machine that can be synchronized to work in conjunction with video display means to permit a batter to visually view a pitcher prior to and during delivery of the pitch.

To the accomplishments of the foregoing objects and advantages, the present invention, in brief summary, comprises a ball-throwing machine of the type having a power head including at

least one and, preferably, three coaxing wheels for propelling a ball toward a batter to simulate a pitch. In the preferred embodiment, the speeds of the three wheels are independently controllable so as to control the ball speed, spin rate and spin axis orientation. It will, of course, be appreciated that the machine can also be used to propel softballs, tennis balls, lacrosse balls and other ball-shaped objects.

The machine includes control means that include means for independently controlling the rotational speed of each wheel, means for independently controlling the alignment of the power head in the horizontal plane, and means for independently controlling the alignment of the power head in the vertical plane so as to permit said machine to interchangeably deliver pitches of differing types to different locations at different speeds. The means for controlling the rotational speed of each wheel further includes means for rapidly accelerating and decelerating the rotational speed of each wheel.

The control means also receives feedback from the means for independently controlling the rotational speed of each wheel, means for independently controlling the alignment of the power head in the horizontal plane, and means for independently controlling the alignment of the power head in the vertical plane so as to ensure the speeds and alignment have been reached.

In a preferred embodiment, the machine includes three coaxing wheels for propelling the ball and a control system for simultaneously controlling the rotational speed of the wheels in combination with the horizontal and vertical alignment of the power head.

The ball-throwing machine of the present invention can be used as a stand-alone pitching machine for training baseball, softball, tennis and lacrosse players. In addition, it may be

combined with a video display device that visually displays an actual pitcher or tennis player and which synchronizes the release of the ball with the video display so as, for example, to simulate an actual pitcher delivering an actual pitch.

the ball is released from the pitcher's hand at the same time as the video display shows the pitcher releasing the ball.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and still other objects and advantages of the present invention will be more apparent from the detailed explanation of the preferred embodiments of the invention in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective illustration of the ball-throwing machine of the present invention;

FIG. 2 is a front elevational view of the ball-throwing machine of the present invention;

FIG. 3 is a side elevational view of the upper portion of the ball-throwing machine of the present invention;

FIG. 4 is a side elevational view of the lower portion of the ball-throwing machine of the present invention;

FIG. 5 is an enlarged sectional view illustrating the manner in which the extension legs engage the upper portion of the ball-throwing machine of the present invention;

FIG. 6 is a top elevational view of the ball-throwing machine of the present invention;

FIG. 7 is a top view of the ball-throwing machine of the present invention illustrating the manner in which the power head of the machine pivots in a horizontal plane;

FIG. 8 is a side view of the ball-throwing machine of the present invention illustrating the manner in which the power head of the machine pivots in a vertical plane;

FIG. 9 is front view of the control panel used in conjunction with the ball-throwing machine of the present invention;

FIG 10 is a schematic of the control panel used in conjunction with the ball-throwing machine of the present invention; and

FIG. 11 is a front view of the controller used to control the ball-throwing machine of the present invention.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and, in particular, to Fig. 1 thereof, the ball-throwing machine of the present invention is provided and is referred to generally by reference numeral 10. The machine 10 includes an upper portion 12 that is mounted on a base 13 that includes a plurality of removable legs 14, preferably a front leg 14A and a pair of rear legs 14B and 14C, respectively, to form a tripod. A shock-absorbing device such as a shock absorber (not shown) may be included in the rear legs 14B and 14C to minimize the impact of any recoil of the machine 10 during use.

An enlarged foot 15 is provided at the outbound end of each leg 14 and is threadably secured to the leg 14 by threaded extension fitting 16 which permits the length of each leg 14 to be increased and decreased. A flat, rubberized plate 17 may be included at the bottom of each foot 15 to provide additional stability for the machine 10, particularly when used indoors such as, for example, on a gymnasium floor. Ball-throwing machines experience substantial recoil upon delivery of each pitch and it is important to stabilize the machine and reduce the effect of such recoil in order to provide consistent, accurate, repeatable results.

As best shown in FIG. 4, the legs 14 are each attached to the upper portion 12 by insertion into and engagement with complementary sockets 18 mounted on the lower surface of the upper portion 12. The sockets 18 are secured to the upper portion 12 by bolts 19. The sockets 18 for the two rear legs 14B and 14C are angled relative to the horizontal plane of the upper portion 12 so that the rear legs 14B and 14C are positioned at approximately a 30 degree angle relative to the upper portion. This provides a wider base and offers greater stability for the machine 10.

Referring again to FIG. 1, the upper portion 12 includes a moveable power head 20

having at least two and preferably three coacting drive wheels 70A, 70B and 70C (only 70A and 70B are shown in FIG. 1) which serve to propel a ball introduced into the machine toward a desired location. It should be appreciated that the use of three coacting wheels permits the ball-throwing machine of the present invention to interchangeably deliver a variety of different pitches without the need for resetting the angle of the power head as is required in other machines such as, for example, the JUGS machine. In such a three wheel design, two wheels serve as the drive wheels while the third wheel serves to impart spin on the ball as it passes in the nip 92 between the coacting wheels 70A-70C.

The ball-throwing machine 10 of the present invention may be used to propel baseballs, softballs, tennis balls, lacrosse balls, and the like depending upon the size of the nip 92 between the coacting wheels 70A-70C.

In a preferred embodiment as illustrated in FIGS. 1-7, the three coacting wheels 70A-70C are positioned at equal distances and angles (120 degrees apart) relative to one another. Thus, in the configuration shown in these Figures, the wheels 70A-70C are positioned at the 10 o'clock, 2 o'clock and 6 o'clock positions. When so configured, when the user wants to throw a fast ball, the 10 o'clock and 2 o'clock wheels are set at the same speed while the bottom or 6 o'clock wheel is set at a higher speed so as to create backspin on the ball. This results in a rising fastball. Similarly, a changeup can be created by proportionally slowing the speed of the three wheels 70A-70C.

A sinking fast ball or "split finger fastball" can be created by decelerating the speed of the 6 o'clock wheel relative to the drive wheels. This creates a topspin on the ball which causes the

pitch to "sink."

The ball-throwing machine 10 is capable of throwing a curve ball by controlling the speed differential of all three drive wheels. By increasing the speed of the 2 o'clock wheel and decreasing the speed of the 10 o'clock wheel relative to the speed of the 6 o'clock wheel, a rotational spin is imparted to the ball which causes it to break in a down and out direction thus simulating an actual curve ball. The amount of break of the pitch can be adjusted by increasing or decreasing the speed differential of the 2 o'clock and 10 o'clock wheels. Similarly, a slider or fast curve ball can be thrown by increasing the speed of all three of the drive wheels.

A screwball is achieved by decreasing the speed of the 2 o'clock and increasing the speed of the 10 o'clock wheel relative to the speed of the 6 o'clock wheel, causing the ball to rotate and break in a down and in direction.

A knuckleball can be thrown by setting each wheel at the same speed. This causes the ball to be propelled from the machine 10 with virtually no spin, thus creating a typical knuckleball. It should be appreciated, however, that the ability to control the delivery location of a knuckleball thrown by the machine is as difficult as the ability to control a knuckleball thrown by a live pitcher.

The upper portion 12 of the machine 10 is pivotally mounted to a base plate 30 at a center ball joint 40. The power head 20 is comprised of a front plate 21 and a rear plate 22, which are attached to one another by three motor mounts 23 that extend between the front plate 21 and the rear plate 22. An aperture 24 is provided in the approximate center of the front plate 21 of the power head 20 through which a ball will be propelled from the machine 10.

It should be noted that the motor mounts 23 are secured to the front plate 21 and the rear plate by a series of bolts 34 which pass through elongated grooves 36 in the front plate 21 and the rear plate 22. This permits the actual position of the motor mounts 23 and the wheels 70A-C which are mounted thereof to be adjusted to accommodate different sized balls, e.g., baseballs, softballs, lacrosse balls, tennis balls, etc. depending upon their position.

The power head 20 is further supported by a pair of pivot wheels 25 that are provided at the opposite sides of the front plate 21 and which permit the power head 20 to rotate in a horizontal direction on the base plate 30.

The power head 20 is adapted to pivot in a horizontal plane about the center ball joint 40 in order to change the horizontal position of the power head 20 relative to a center position and, therefore, the angle at which a ball is delivered to a batter. Actual movement of the power head 20 in a horizontal plane is effected by a horizontal linear actuator 50 which is provided on the upper surface of the base plate 30. Horizontal linear actuator 50 includes a horizontally extending shaft 52 which extends from the horizontal linear actuator 50 to the inside surface of the front plate 21. The horizontal linear actuator 50 serves to cause the power head to pivot in a horizontal direction about the front center ball joint 40.

A spring 26 holds the power head against the linear actuator 50 removing backlash from the linear actuator internal mechanism, thereby increasing the accuracy of the horizontal alignment of the power head 20. Spring 26 is secured between a post 27 that extends upwardly from the base plate 30 and the inside surface of the front plate 21.

The power head 20 is further adapted to pivot in the vertical plane about an axis defined

by the center ball joint 40 and the wheels 25, in order to change the vertical angle of the power head 20 relative to the base plate 30 and, therefore, the vertical angle at which a ball is delivered to a batter. A vertical linear actuator 60 having a downwardly extending shaft 62 is provided on the outer surface of the rear plate 22. The vertical linear actuator 60 permits the power head 20 to pivot in the vertical plane about the front center ball joint 40.

It should be appreciated that the ability to move the power head 20 in both a horizontal and vertical direction is critical not only to be able to throw pitches to different locations in the strike zone but, more importantly, to permit it to throw breaking pitches as well as pitches of differing speeds. Any ball-throwing machine that is intended to deliver interchangeable pitches of differing types must be able to be repositioned in the horizontal and vertical planes of the power head on a pitch by pitch basis.

The power head 20 is thus able to be repositioned in both a vertical and horizontal planes by the use of horizontal and vertical linear actuators. By extending or retracting the shaft 52 or 62 of such actuators 50 and 60, respectively, the power head 20 is moved in such directions by pivoting about the center ball joint 40.

For example, when one desires to change from a fastball to a changeup (where the speed of the pitch is decreased by at least 10 MPH), the trajectory angle of the pitch must be raised to overcome the effect of gravity on the slower pitch. To accomplish this, the power head 20 is pivoted about the center pivot 40 such that the angle of the pitch trajectory is raised to accommodate the effect of gravity on the pitch. This is accomplished by retracting the shaft 62 of the vertical actuator 60, thereby tilting the power head 20 in an upward direction.

Similarly, the power head 20 may be repositioned to throw a curve ball as follows. The shaft 62 of the vertical linear actuator 60 is retracted so as to cause the angle of trajectory of the pitch to rise while also changing the horizontal position of the power head 20 by retracting the shaft 52 of the horizontal linear actuator 50 causing the power head to point to the side of the plate away from the break.

By pivoting the power head 20 both horizontally and vertically about the center ball joint 40 located at the front of the machine 10, the actual movement of the machine in either or both a horizontal or vertical direction is minimized and, as such, is imperceptible to a batter. Such imperceptibility would be improved if both pivot axes passed through the aperture 24 in the front plate 20.

FIGS. 7 and 8 illustrate the manner in which the power head 20 rotates about the center ball joint 40 relative to the base plate 30 in both a horizontal and vertical direction. As shown in FIG. 7, one can effect rotation of the power head 20 in a horizontal direction by extension and retraction of the shaft 52 of the horizontal linear actuator 50. Pivot wheels 25 assist in rotation of the power head 20.

Similarly as shown in FIG. 8, the power head 20 is able to rotate in a vertical plane about the center ball joint 40 upon the extension and retraction of the shaft 62 of the vertical linear actuator 60. Obviously, repositioning the power head 20 will affect the eventual trajectory of the balls being propelled from the machine 10.

Control cables (not shown) connect the horizontal and vertical linear actuators 50 and 60 to remote actuator controls 204 and 206 contained in a remote control box 200 (see Figs. 9-10)

which can be mounted on the bottom of the base plate 30.

As shown in FIG. 1, the three coating drive wheels 70A, 70B and 70C of the ball-throwing machine 10 each include a solid hub 72, preferably composed of aluminum, steel or composite material and an outer coating 73 of a deformable material having a relatively high coefficient of friction so as to permit the wheels 70A-70C to sufficiently grip a ball with a minimum of slip in order to propel it toward a batter. Preferred materials for this outer coating include urethane, nitrile rubber and butyl rubber and a preferred hardness for the material is between 25 and 60 Durometer A with a particularly preferred hardness between 40 and 50 Durometer A. While softer materials provide greater conformity to the balls being propelled and allow the machine to be used with a wider variety of balls, such materials have been found to lack the durability required for a commercial product. Moreover, materials having a hardness above 60 Durometer A typically cause a greater slippage of the balls during use which result in decreased machine accuracy.

While the diameter of the coating wheels 70A-70C can be between eight and 20 inches, a diameter of between 12 and 16 inches is preferred. Wheels having a diameter of approximately 16 inches are particularly preferred. It has been found that larger wheels reduce slippage between the wheels and the balls, thereby increasing the accuracy of the machine. Similarly, larger wheels are advisable when attempting to achieve ultimate ball speeds greater than 90 MPH. Due to the speeds at which these wheels rotate, i.e., up to about 3500 RPM, it is preferable that the hubs be solid and balanced to minimize vibration.

The coating wheels 70A-70C are each powered by drive motors 80 which are attached to

the wheels by motor shafts 82 which extend through the motor mounts 23 and are secured to the wheels 70A-70C by "Tran torque" expanding bushings 84. While drive motors 80 can be virtually any DC or AC motor with sufficient power to rotate the wheels 70A-70C at the desired speeds, one of the essential elements of this machine 10 is the ability to rapidly accelerate and decelerate the coaxing wheels 70A-70C to permit the machine to interchangeably deliver a variety of different pitches in a relatively short period of time, i.e., less than 7-10 seconds. There are situations where it is necessary to rapidly accelerate a wheel from, for example, 1200 RPM to 2500 RPM while, simultaneously decelerating another wheel from 2500 RPM to 1500 RPM.

The ability to rapidly accelerate and decelerate the speed of these wheels 70A-70C accurately coming to the new speed is a critical feature of this invention. The DC motors heretofore used by other ball-throwing machines were found to be incapable of achieving the rapid acceleration and deceleration of the coaxing wheels required for such a machine. For example, one of the stated objectives of this ball-throwing machine is to be able to deliver different pitches within a 7-10 second time period to simulate actual batting practice conditions with live pitchers. This, of course, requires rapidly accelerating and decelerating certain wheels within this limited period to be able to deliver these different pitches.

It has been determined that such rapid and accurate acceleration and deceleration of the wheels can be easily achieved by the use of AC motors with companion motor drives including dynamic or regenerative braking circuits. Particularly good results have been achieved using a three phase, AC motor that is capable of providing at least $\frac{3}{4}$ HP. A particularly preferred AC motor is the 1HP motor marketed by Baldor as model number VM 3116.

The drive motors 80 are each connected to remote variable speed AC motor drives 202A-202C in control box 200 (see Fig. 9) by cables 85. It is important that these AC motor drives include a dynamic or regenerative braking circuit to permit rapid deceleration of the coating wheels 70A-70C in order to allow the rapid interchangeability of pitches. A particularly preferred AC motor drive is the AC Tech MC1000 Variable Frequency Drive marketed by AC Technology Corporation of Uxbridge, MA which includes a dynamic or regenerative braking circuit to permit rapid deceleration of the motor and wheel.

Ball introduction tube 90 shown in FIG. 1 is provided for introducing a ball into the ball-throwing machine 10 into the nip 92 formed between the coating wheels 70A-70C. It will be appreciated that the ball-throwing machine 10 of the present invention may be operated either manually with a coach or other individual hand feeding balls to the machine or, alternatively, the machine 10 may be used in combination with a conventional automatic remote ball feeder of the type commonly used in conjunction with the JUGS and ATEC machines for automatically introducing balls into the machine 10 between the coating wheels 70A-70C. It will be appreciated, however, that such automatic ball feeders must be modified to work in conjunction with the ball-throwing machine 10 of the present invention due to the movement of the power head 20. In this regard, it is necessary to provide for a flexible, preferably transparent connection between the ball feeder and the power head 20 to accommodate the movement of the power head 20. In either event, however, a ball is introduced into the nip 92 between the coating wheels 70A-70C for propulsion through the machine 10.

A pointer device 100, preferably a laser pointer device, is provided on the base plate 30,

preferably at the front or batter side thereof. The pointer device 100 is provided to assist the user in properly aligning the ball-throwing machine 10 in a manner that will be explained in detail herein.

A pair of transport wheels 110 is also provided on opposite sides of the base plate 30 to facilitate relocation and transportation of the machine 10. It will be appreciated that these wheels will permit the user to simply roll the machine onto or off the field before insertion of legs 14 preparatory to use of the machine 10.

Warning lights 112 and 114 are provided on the front plate 21 of the power head 20, preferably above the ball delivery aperture 24 or in any other location where they can be easily seen by the batter. The purpose of these warning lights 112, 114 is to alert the batter to the condition of the machine. The upper light 112 is an ON/OFF indicator. When illuminated as a constant GREEN, it advises the batter that the machine is on and ready to deliver a pitch. There are times when the power head 20 is moving and is incapable of actually delivering a pitch. In those instances, the light will "Flash" to so alert the batter. Upon reaching a set and ready position, it will become a constant GREEN.

The bottom light 114 is intended to advise the batter that a ball has been released and is entering the nip 92 between the coacting wheels 70A-70C and is, therefore, about to be pitched. In a normal condition, it will not be illuminated. This light is intended to alert the batter that a ball will be propelled within a fixed period of time, e.g., 1 second, to permit the batter to set for the subsequent pitch. Thus, when both lights are "GREEN," the machine is ready and about to deliver a pitch to the batter.

The ball-throwing machine 10 of the present invention is controlled by a programmable control unit 200 that is housed in a separate control box 201 (see FIG. 9). As illustrated in FIG. 1, the control unit 200 may be secured to the underside of the base plate 30 or, alternatively, as a separate stand-alone box which is connected to the ball-throwing machine by an umbilical cord (not shown). In either event, however, the control unit 200 is electrically connected to and provides the controls for the ball-throwing machine 10 of the present invention.

As shown in greater detail in FIG. 9-10, the control unit 200 includes drive motor controls 202A-202C, which are electrically connected to and control their respective drive motors 80A-80C. As noted earlier, particularly preferred AC motor drives are the AC Tech MC1000 Variable Frequency Drive marketed by AC Technology Corporation of Uxbridge, MA which includes a dynamic braking circuit and resistors to permit rapid deceleration of the motor and coasting wheels 70A-70C.

A vertical actuator control 204 is provided which is electrically connected to and controls the vertical linear actuator 60. Similarly, a horizontal actuator control 206 is provided which is electrically connected to and controls the horizontal linear actuator 50. A programmable controller 208 is provided to control all of the various operations of the ball-throwing machine. A particularly preferred controller is the MultiPro+ MC controller, manufactured by Control Technology, Inc.

In addition, control unit 200 includes a controller power supply 210, controller terminal blocks 212, a filter fan 214, a fuse block 216 and an inlet filter 218.

As shown in greater detail in the schematic of FIG. 10, the controller 208 is electrically

connected to and controls the drive motor controls 202A-C and the actuator drives 204 and 206. A remote handheld terminal 220 is electrically connected to the programmable controller 208 for use by a coach or user.

FIG. 11 depicts the layout of the remote handheld terminal 220 which is intended to be used by the coach or batter to control the ball-throwing machine of the present invention. The terminal includes a display area 222 where the type of pitch, location and speed are displayed using an LCD display. A series of mode LED's 224 are provided to indicate the mode in which the ball-throwing machine is to operate, i.e., manual, automatic, set and home. The mode LED's correspond to mode selection keys 226 which permit the user to select the actual mode of the machine which then result in an illumination of the corresponding mode LED's.

In the manual mode, the ball-throwing machine 10 is programmed to deliver a single pitch at a time corresponding to the pitch that is manually selected by the coach. Depression of the "Man" key of the mode selection keys 226 will cause the machine 10 to operate in the manual mode.

In the automatic mode, the ball-throwing machine 10 is programmed to deliver a series of pitches, e.g., twenty or more, in a predetermined sequence. Depression of the "Auto" key of the mode selection keys 226 will cause the machine 10 to operate in the automatic mode.

In the automatic mode, the user will be queried as to which sequence the user wants, e.g., right-hand pitcher to right-hand batter, left-hand pitcher to right-hand batter, etc., and which particular choice of sequence, e.g., the Kevin Brown series, etc. which would simulate an actual sequence of pitches delivered by a particular pitcher. The user may move from selection to

selection using the "Position Adjustment Keys" 232.

The "Home" key 225 is intended to permit the user to "fine adjust" the vertical delivery of pitches to accommodate a particular batter. For example, it might be desirable to "lower" the over strike zone where the batter is 5' 6" and then raise it for the next batter who is 6' 2". Fine adjustment of the strike zone is accomplished using the Position Adjustment Keys 232 that have an arrow on their surface.

The "Shift" key 227 is the equivalent of the "Enter" key on a computer in that it actually enters the selections made by the user into the controller. The "Shift" key also serves to order the delivery of pitches in a manual mode.

An "On" key 228 is provided which serves as the on/off control for the machine 10.

The ball-throwing machine 10 is programmed to operate at predetermined set speeds, i.e., fast, medium and slow, and these are selected by depression of the appropriate "Pitch Speed Key" 238. For example, when programmed to operate in the fast mode, all pitches will be based on a 90 MPH fastball. In the medium mode, all pitches will be based on an 80 MPH fastball and in the slow speed, all pitches be based on a 70 MPH fastball. It should be appreciated that these settings are purely arbitrary and can be easily changed. For example, where the ball-throwing machine is intended to be used for a major league team, the three settings, i.e., fast, medium and slow, could be, for example, based on a 95 MPH fastball, a 90 MPH fastball and an 85 MPH fastball, respectively. Similarly, the actual number of pitch speed keys can be increased or decreased depending upon the particular application.

The actual type of pitch being delivered by the ball-throwing machine 10 of the present

invention is selected by depression of the appropriate "Pitch Type Key" 230. The ball-throwing machine 10 of the present invention is programmed to deliver the following types of pitches: rising fastball, sinker or split-finger fastball, changeup, curveball and slider. Other pitches can be added, if desired.

5 Similarly, the location of the pitch in the strike zone can be controlled by depressing the appropriate "Pitch Location Key" 236 which have baseballs on their surface. The ball-throwing machine 10 has been preprogrammed to deliver pitches to five locations within the strike zone, i.e., high and outside, high and inside, low and outside, low and inside, and center, all based on a right hand batter. Depression of the appropriate Pitch Location Key 236 will direct the machine 10 to deliver the pitch to the appropriate location in the strike zone.

Obviously, these five locations are arbitrary and can be varied depending upon the particular application. For example, a coach might find it desirable to deliver pitches actually outside the strike zone to assist a hitter in learning the strike zone. Similarly, the number of locations within the strike zone can be changed to, for example, nine locations rather than the indicated five.

A data table is pre-programmed in the programmable controller 208 which determines the appropriate pre-determined settings for the speed of each of the coacting wheels 70A-70C and the positions for the horizontal linear actuator 50 and vertical linear actuator 60 for each of the pitches selected and their location. An example of such a data table is included in Table 1, which
20 establishes the respective wheel speed and the actuator settings for a series of pitches based on an 80-MPH fastball.

TABLE 1--MEDIUM (80 MPH) SERIES

Pitch Type	Location	Pitch Speed	Wheel A Speed	Wheel B Speed	Wheel C Speed	Horizont. Setting	Vertical Setting
Fast Ball	1	80	1150	1800	1150	763	500
Fast Ball	2	80	1150	1800	1150	755	535
Fast Ball	3	80	1150	1800	1150	775	535
Fast Ball	4	80	1150	1800	1150	755	470
Fast Ball	5	80	1150	1800	1150	775	470
Sinker	1	80	1400	1250	1400	761	765
Sinker	2	80	1400	1250	1400	750	795
Sinker	3	80	1400	1250	1400	775	795
Sinker	4	80	1400	1250	1400	750	725
Sinker	5	80	1400	1250	1400	775	725
CurveBall	1	69	1000	1000	1800	815	850
CurveBall	2	69	1000	1000	1800	805	890
CurveBall	3	69	1000	1000	1800	825	890
CurveBall	4	69	1000	1000	1800	805	825
CurveBall	5	69	1000	1000	1800	825	825
Slider	1	74	950	950	2150	812	850
Slider	2	74	950	950	2150	802	888
Slider	3	74	950	950	2150	822	888
Slider	4	74	950	950	2150	802	825
Slider	5	74	950	950	2150	822	825
ScrewBall	1	70	1850	1100	1100	725	870
ScrewBall	2	70	1850	1100	1100	715	900
ScrewBall	3	70	1850	1100	1100	740	900
ScrewBall	4	70	1850	1100	1100	715	835
ScrewBall	5	70	1850	1100	1100	740	835
Changeup	1	65	1000	1700	1000	765	620
Changeup	2	65	1000	1700	1000	755	650
Changeup	3	65	1000	1700	1000	775	650
Changeup	4	65	1000	1700	1000	765	590
Changeup	5	65	1000	1700	1000	775	590

With respect to the aforementioned table, the pitch type will designate the type of pitch

5 desired and will correspond to the Pitch Type keys 230 on the hand held terminal 220, e.g.,

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

fastball, sinker, curveball, slider, screwball and changeup. Similarly, the location in the chart relates to the pitch location as determined by the Pitch Location key 236 on the terminal 220.

Typically, a pitch down the center is designated by numeral 1 followed by a high and outside pitch "2", high and inside pitch "3", low and outside pitch "4" and low and inside pitch "5".

5 The individual wheel speeds for wheels A, B and C correspond to the wheel speeds for each of the individual coacting drive wheels 70A-70C. The horizontal setting corresponds to the setting on the horizontal actuator control 206 and the vertical setting corresponds to the setting on the vertical actuator control 204. Each of these settings is derived manually by determining the optimal pitch settings for a particular pitch.

It will be appreciated that similar tables are constructed with respect to each of the pitch speed settings determined by the pitch speed key 238 on the hand held terminal 220, e.g., the slow series based on a 70 MPH fastball and the fast series based on a 90 MPH fast ball. As previously noted, these can vary according to the specific desired pitch speed.

As previously noted, the ball-throwing machine of the present invention can operate in an automatic mode in which the programmable controller 208 instructs the machine 10 to throw a predetermined sequence of pitches to predetermined locations, typically within a particular speed set. For example, the machine 10 can be programmed to throw a twenty pitch set in the following order: center fastball; fastball high and in; curve ball down and out; sinker down and in; fast ball high and in; screwball down and in; changeup down and out; fastball down and in; slider high and out; fastball high and out; screwball down and in; curveball down and out; etc. Virtually any combination of pitches can be programmed to establish the particular sequence and it can be

created to achieve a right hand pitcher vs. a right hand batter; a right hand pitcher vs. a left hand batter; a left hand pitcher vs. a right hand batter; and a left hand pitcher vs. a left hand batter.

Moreover, there are times that it might be necessary to change the particular pitch profile for a particular pitcher, e.g., to increase the break of the sinker for Hideo Nomo, etc. This can be accomplished by modifying the wheel settings in the data table to achieve a different pitch.

These data tables can be programmed into the controller 208 using a computer. To facilitate the re-programming of the data table, the programmable controller 208 can be attached to a remote magnetic strip "smart card" reader. In this manner, a particular pitch sequence can be stored on a smart card which may be read by the smart card reader to immediately re-program the controller 208 and, thereby, change the automatic pitch sequence. This would permit the user to be able to immediately change sequences to simulate a variety of different pitches. Similarly, the smart card can be used to change the profile of a particular pitch, e.g., a 98-MPH fastball for Roger Clemens rather than the "generic" 90-MPH fastball.

Thus, it is possible to develop a series of smart cards that could be used to program the machine 10 to simulate the profile of the actual pitches of a pitcher such as Kevin Brown and the sequence to which he might pitch a particular batter, such as Mike Piazza.

The ball-throwing machine 10 of the present invention can also be used in conjunction with a video display device on which a pitcher is actually depicted winding up and delivering a pitch. This, of course, offers the advantage of permitting a batter to time their swing against simulated live pitching. Video display devices have been used in commercial batting cages. One such device is marketed under the mark Power Alley by the MIR Corporation of Atlanta, GA.

Currently, such a device uses a conventional ball-throwing device to propel tennis balls to the hitter with no spin at speeds of less than 60 MPH.

The marriage of such technologies provides actual pitch simulation of the highest order. A batter would be able to take swings against a video of a particular pitcher throwing a series of pitches of the same speed and profile as that pitcher might actually pitch in a live game. Moreover, it would be possible to establish a pitch sequence to simulate the actual pitch sequence that such a pitcher might use in actual competition.

Obviously, it would be necessary to synchronize the release of the ball from the pitching machine 10 with the video display but this can be accomplished by coordinating the release of the ball from a feeder device to the image on the video screen to insure that the ball is being released from the pitching machine at the time the pitcher on the video screen is delivering a pitch.

Using the smart card reader, the machine 10 can be programmed to simulate the pitches of the actual pitcher being displayed on the video screen. This would include specific settings for the wheels 70A-C and the horizontal and vertical linear actuators 50 and 60 so as to properly profile the pitches of the particular pitcher and to insure that they are being delivered in a pre-determined pitch sequence.

OPERATION OF MACHINE

The ball-throwing machine 10 of the present invention may be operated both outdoors on a field and indoors in a gymnasium or batting cage facility. It is positioned on the pitcher's mound or at a distance of approximately 60 feet (or 45 feet for Little League distances) from the batter's

box. The ball-throwing machine 10 must initially be leveled and then properly aligned relative to home plate. In order to assist in the proper alignment of the ball-throwing machine, the laser pointer device 100 is used to project a laser beam toward home plate against a target (not shown) which is positioned at the center of the intended strike zone. The ball-throwing machine 10 should be manually positioned such that the laser beam falls in the center of the target. Horizontal adjustment of the ball-throwing machine 10 is accomplished by simply repositioning the machine 10 in a horizontal direction while vertical adjustment is accomplished by raising or lowering the front leg 14A of the base 13.

When the ball-throwing machine 10 is properly positioned relative to home plate, it is ready for operation. It should be appreciated that upon startup of the machine 10, the control unit 200 automatically positions the power head 20 in a center position for a center fast ball at the medium speed. That is the “home” or default position and the power head 20 will always return to that position on startup.

If the machine is to be used with particularly short or particularly tall batters, the machine can be adjusted to accommodate a particular strike zone either manually or automatically.

Manual adjustment is accomplished by changing the vertical height of the front leg 14A by adjusting the extension fitting 16. Alternatively, it is possible to “fine tune” the strike zone in a vertical direction using the “home” feature on the handheld terminal 220 using the up and down arrows of the pitch selection keys 232. Upon startup of the machine 10, however, any previous “fine tune” adjustment is lost and the power head 20 of the machine 10 returns to its normal default position.

Balls can be introduced into the ball-throwing machine 10 either manually by a coach or automatically using a conventional ball feeder device (not shown). As previously noted, the machine 10 is adapted to be used in conjunction with a conventional elongated sleeve feeder device of the type commonly used with commercial pitching machines such as the JUGS and ATEC machines. As the power head 20 of the present ball-throwing machine 10 is movable, it is necessary to connect the ball feeder to the ball introduction tube 90 using a flexible, preferably transparent, connection to allow the batter to actually see the delivery of the ball into the machine 10.

Such feeders are electrically wired to the control unit 200, which controls the release of balls either manually or automatically at predetermined time intervals. For example, when the machine is in the manual mode, balls will be released upon the depression of the "Shift" key 227 on the terminal 220. When put in the automatic mode, balls will be released at predetermined time intervals.

A ball detection switch is provided on the ball feeder means to detect the release of a ball and to illuminate the lower warning light 114 to warn the batter.

Upon proper positioning of the ball-throwing machine 10 relative to home plate, the machine is turned on by depression of the ON/OFF switch on the terminal 220. Upon activation of the ON/OFF switch, the machine immediately goes to a default setting in which the machine is set to pitch a Medium fastball down the center of home plate. In addition, the upper warning light 112 is illuminated, thereby alerting the user to the fact that the machine 10 is on and potentially ready to pitch.

The user then has the option of operating the machine 10 in either a manual or an automatic mode and this selection is made by depression of the appropriate mode selection key 226. In the manual mode, the user is prompted to make three choices: the speed selection, i.e., fast, medium or slow; the pitch type, i.e., fast ball, sinker, curve ball, slider, changeup and screwball; and the pitch location, i.e., one of five locations in the strike zone. The appropriate selection is made by depression of the applicable key on the terminal 220. These keys can be depressed in any order and upon depression of the applicable key, the relevant information will be displayed on the display area 222.

Upon entering the applicable information, the user is prompted to hit the "Set" key on the terminal and information is stored in the controller 208. This determines the appropriate settings for the particular pitch at the particular location from the stored data table and then sends signals to the drive control motors 202A-202C, the horizontal actuator controller 206 and the vertical actuator controller 204 providing them with the applicable settings for the particular pitch. Upon receipt of the applicable signal, each of the drive motor controls 202 set their corresponding drive motors 80 to the specified speed to accomplish the desired wheel speed and the two actuator controllers 204, 206 set their corresponding actuators to the specified positions to position the power head 20 in the desired position. The affect of this is to reposition the power head 20 in the proper position to deliver the specified pitch to the predetermined position with the coacting wheels 70A-C rotating at an appropriate speed to deliver the selected pitch.

The controller waits for the proper feedback from the drive control motors 202A-202C, horizontal actuator controller 206 and vertical actuator controller 204 to indicate the pwer head

20 is in the correct position and the wheels 70A-C are spinning at the correct rotational velocity.

It typically takes between 3 and 4 seconds and always less than ten seconds for the power head 20 to move to the predetermined position during which the upper warning light 112 on the front of the machine 10 is flashing. Upon reaching that position, the upper light 112 turns green and the machine is ready to accept a ball which can be either released from an automatic feed device by depressing the "Shift" key 227 on the remote terminal 220 or, alternatively, by manually feeding a ball into the ball introduction tube 90. Upon reaching the nip 92 between the coacting wheels, the ball will be delivered to the batter by the machine.

The ball-throwing machine 10 can also be operated in an automatic mode by the depression of the "Auto" key on the terminal 220. Upon the depression of the "Auto" key, the user will be queried as to what sequence is desired. As previously noted, virtually an unlimited number of pitch sequences can be programmed including, for example, sequences based on the throwing arm of the pitcher and whether a batter is left handed or right handed. Actual choices will be made by using the "Position Adjustment Keys" 232.

Upon depression of the "Auto" key and selection of the particular sequence, the hitter then selects the appropriate pitch speed set by depression of the appropriate "Pitch Speed Key" 238. At that time, the control unit of the machine 10 takes over, delivering pitches to the batter in a predetermined sequence of particularly profiled pitches.

As previously noted, the controller 208 can be readily reprogrammed by the use of a smart card which is meant to work in conjunction with a smart card reader attached to the controller 208. In this manner, one could readily reprogram the machine 10 to deliver a predetermined

sequence of pitches of a particular profile. This would permit the machine 10 to simulate the actual pitching sequence of a particular pitcher.

Having thus described the invention with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications can be made therein without departing from the spirit and scope of the present invention as defined by the appended claims.

5

03/01/99

1 **WHEREFORE, WE CLAIM**

2 1. A ball-throwing machine including means to interchangeably deliver pitches of different
3 types to different locations at different speeds with less than ten second intervals between said
4 pitches of different type, location and speed.

5
6 2. A ball-throwing machine of the type having a power head including at least two
7 coacting wheels for propelling a ball toward a batter to simulate a pitch, said machine including:
8 means for controlling the rotational speed of each wheel;
9 means for controlling the horizontal position of the power head; and
10 means for controlling the vertical position of the power head;
11 said machine being able to interchangeably deliver pitches of different types to different locations
12 at different speeds with less than ten-second intervals between said pitches of different type,
13 location and speed.
14

1 3. A ball-throwing machine of the type having a power head including three coaxing
2 wheels for propelling a ball toward a batter to simulate a pitch, said machine having:
3 means for causing each of said wheels to rotate at a predetermined speed;
4 means for causing the power head to move to a predetermined horizontal position;
5 means for causing the power head to assume a predetermined vertical position; and
6 means for controlling the rotational speed of each wheel, the horizontal position of the
7 power head and the vertical position of the power head;
8 said machine being able to interchangeably deliver pitches of different types to different locations
9 at different speeds with less than ten second intervals between said pitches.

10
11 4. The ball-throwing machine of claim 3, wherein said wheels are positioned on said
12 power head at equal distances relative to the ball being propelled.

13
14 5. The ball-throwing machine of claim 3, wherein said means for controlling the rotational
15 speed of each wheel includes a motor and a drive control, wherein said drive control includes
16 means for rapidly changing the speed of each wheel.

17
18 6. The ball-throwing machine of claim 5, wherein said means for rapidly decelerating the
19 speed of each wheel comprises dynamic braking means.

20
21 7 The ball-throwing machine of claim 5, wherein said motor is an AC motor.

1 8. The ball-throwing machine of claim 3, wherein said power head is pivotably mounted
2 on a base at a center pivot about which the power head may be pivoted in both a horizontal and a
3 vertical direction.

4
5 9. The ball-throwing machine of claim 8, wherein said means for causing the power head
6 to move to a predetermined horizontal position comprises at least one horizontal linear actuator
7 adapted to cause said power head to rotate in a horizontal plane about a center pivot and wherein
8 said means for causing the power head to move to a predetermined vertical position comprises at
9 least one vertical linear actuator adapted to cause said power head to rotate in a vertical plane
10 about said center pivot.

11
12 10. The ball-throwing machine of claim 3, wherein said means for controlling comprises a
13 programmable controller.

14
15 11. The ball-throwing machine of claim 10, wherein said programmable controller
16 includes a programmable microprocessor.

17
18 12. The ball-throwing machine of claim 11, wherein said programmable microprocessor
19 includes a data table that includes the speed of each wheel, the horizontal position of the power
20 head and the vertical position of the power head for each pitch type at each speed and each
21 location.

1 13. The ball-throwing machine of claim 11 wherein said programmable microprocessor
2 may be operated in a manual mode in which an individual can manually select for each pitch its
3 type, speed and location or in an automatic mode in which the microprocessor is pre-programmed
4 to deliver different pitches at different speeds to different locations in a pre-programmed
5 sequence.

6
7 14. The ball-throwing machine of claim 11, wherein said programmable microprocessor
8 includes a smart card reader adapted to read a pre-programmed smart card in order to re-program
9 said microprocessor.

10
11 15. The ball-throwing machine of claim 14, wherein the smart card contains a pre-
12 programmed sequence of pitches.

13
14 16. The ball-throwing machine of claim 3, wherein said ball-throwing machine further
15 includes means to visually display an image of a pitcher on a video display and means to
16 synchronize the propelling of said balls from said machine with the image displayed on the video
17 display.

1 17. A ball-throwing machine of the type having a power head including at least two
2 coacting wheels for propelling a ball toward a batter to simulate a pitch, said machine including:
3 means for causing each of said wheels to rotate at a predetermined speed;
4 means for causing the power head to move to a predetermined horizontal position;
5 means for causing the power head to assume a predetermined vertical position;
6 a programmable controller for individually controlling the rotational speed of each wheel,
7 the horizontal position of the power head and the vertical position of the power head;
8 said machine being able to interchangeably deliver pitches of different types to different locations
9 at different speeds with less than ten second intervals between pitches.

10
11 18. The ball-throwing machine of claim 17, wherein said power head has three coacting
12 wheels.

13
14 19. The ball-throwing machine of claim 17 further including means to visually display an
15 image of a pitcher on a video display and means to synchronize the propelling of said balls by said
16 machine with the image displayed on the video display.

17

1 20. A ball-throwing machine of the type having a power head including at least two
2 coacting wheels for propelling a ball toward a batter to simulate a pitch, said machine including:
3 means for causing each of said wheels to rotate at a predetermined speed;
4 means for causing the power head to move to a predetermined horizontal position;
5 means for causing the power head to assume a predetermined vertical position;
6 a programmable controller for individually controlling the rotational speed of each
7 individual wheel, the horizontal position of the power head and the vertical position of the power
8 head; and
9 a smart card reader adapted to read a pre-programmed smart card in order to re-program
10 said programmable controller, wherein said smart card contains a pre-programmed sequence of
11 pitches;
12 said machine being able to interchangeably deliver pitches of different types to different locations
13 at different speeds with less than ten second intervals between pitches.

15 21. The ball-throwing machine of claim 20, wherein said power head has three coacting
16 wheels.

18 22. The ball-throwing machine of claim 20 further including means to visually display an
19 image of a pitcher on a video display and means to synchronize the propelling of said balls by said
20 machine with the image displayed on the video display.

1 23. A ball-throwing machine of the type having a power head including at least two
2 coacting wheels for propelling a ball toward a batter to simulate a pitch, said machine including:
3 means for causing each of said wheels to rotate at a predetermined speed;
4 means for causing the power head to move to a predetermined horizontal position;
5 means for causing the power head to assume a predetermined vertical position;
6 a programmable controller for individually controlling the rotational speed of each
7 individual wheel, the horizontal position of the power head and the vertical position of the power
8 head;
9 a smart card reader adapted to read a pre-programmed smart card in order to re-program
10 said microprocessor, wherein said smart card contains a pre-programmed sequence of pitches; and
11 means for visually displaying an image of a pitcher on a video display and means to
12 synchronize the propelling of said balls with the image displayed on the video display,
13 said machine being able to interchangeably deliver pitches of different types to different locations
14 at different speeds with less than ten second intervals between pitches.
15

16 24. The ball-throwing machine of claim 23, wherein said power head has three coacting
17 wheels.
18

1 25. A sports training device, said device including:

2 means for displaying the image on a surface of a sports figure in motion; and

3 means for interchangeably propelling balls of different types through said surface in
4 synchronization with said image to different locations at different speeds and different rotational
5 velocities with less than ten-second intervals between successive balls being propelled.

6
7 26. The sports training device of claim 25, wherein said device is a batting cage.

8
9 27. The sports training device of claim 26, wherein said sports figure is a pitcher winding
10 up and throwing a baseball.

11
12 28. The sports training device of claim 25, wherein said means for propelling comprising
13 a ball-throwing machine of the type having a power head including at least two coacting wheels
14 for propelling a ball, said machine including:

15 means for controlling the rotational speed of each wheel;

16 means for controlling the horizontal position of the power head; and

17 means for controlling the vertical position of the power head.

18
19 29. The sports training device of claim 28, wherein said means for propelling further
20 includes means for programming said ball-throwing machine to deliver a predetermined sequence
21 of pitches of a predetermined profile.

1

2

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4

5

6

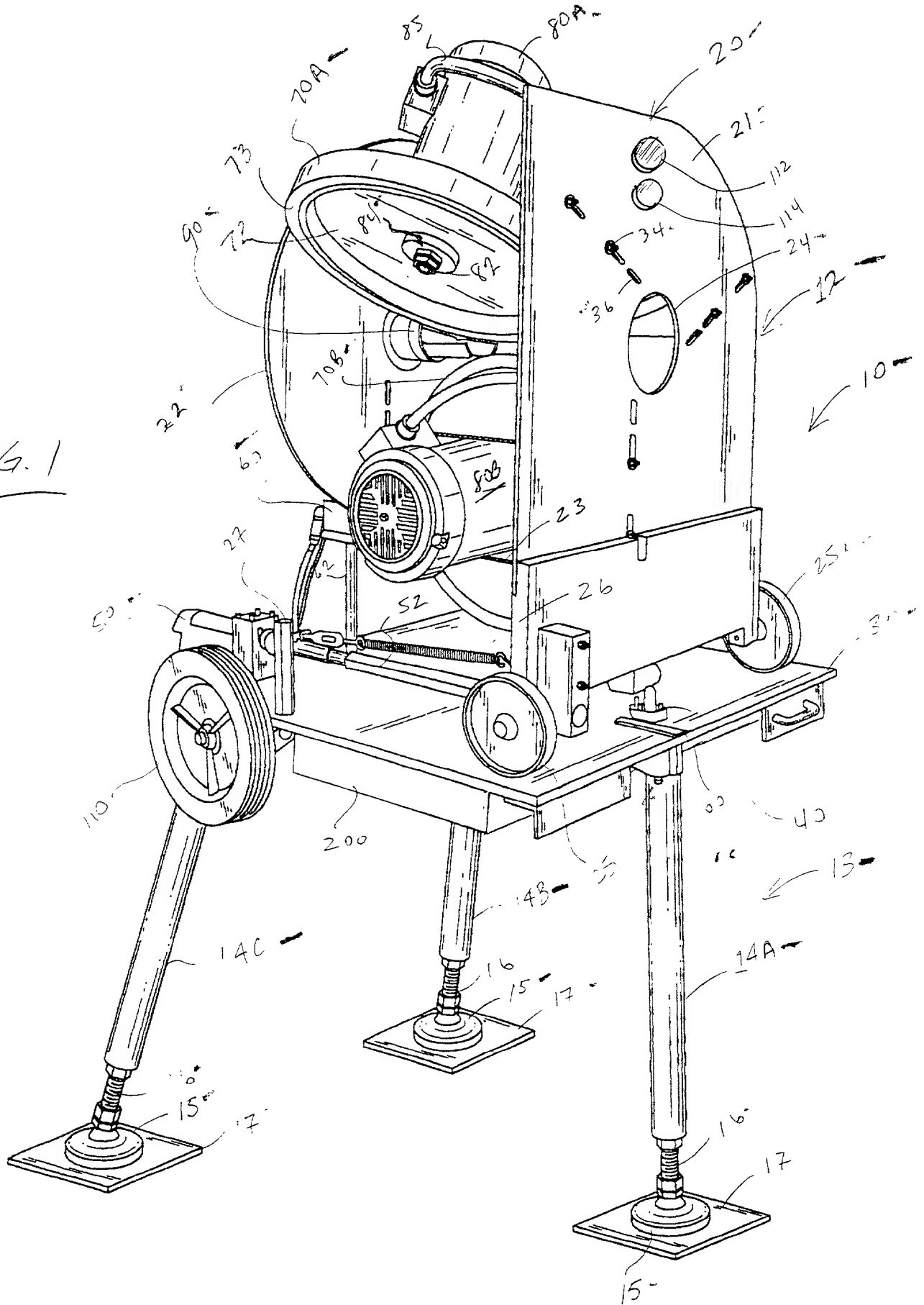
30. The sports training device of claim 29, wherein said means for programming comprises a smart card on which is contained said predetermined sequence of pitches and said predetermined profile and which is adapted to be read by a smart card reader.

30. The sports training device of claim 29, wherein said means for programming comprises a smart card on which is contained said predetermined sequence of pitches and said predetermined profile and which is adapted to be read by a smart card reader.

ABSTRACT OF THE DISCLOSURE

A ball-throwing machine is provided which may be used for throwing baseballs, softballs and the like. The machine includes a power head having at least two and preferably three coacting wheels for propelling a ball toward a batter to simulate a pitch. Three AC motors and companion motor drives are provided for causing the wheels to rotate at predetermined speeds. The motor drives include dynamic braking circuits to permit rapid deceleration of the wheels. A pair of linear actuators is provided to permit the power head to be moved to predetermined horizontal and vertical positions. A programmable controller is included for individually controlling the rotational speed of each individual wheel, the horizontal position of the power head and the vertical position of the power head. A smart card reader may be employed for programming of the controller and the machine is adapted to be used in conjunction with a video display to simulate the actual pitching of a baseball by a pitcher. The machine is able to interchangeably deliver pitches of different types to different locations at different speeds with less than ten-second intervals between pitches.

FIG. 1



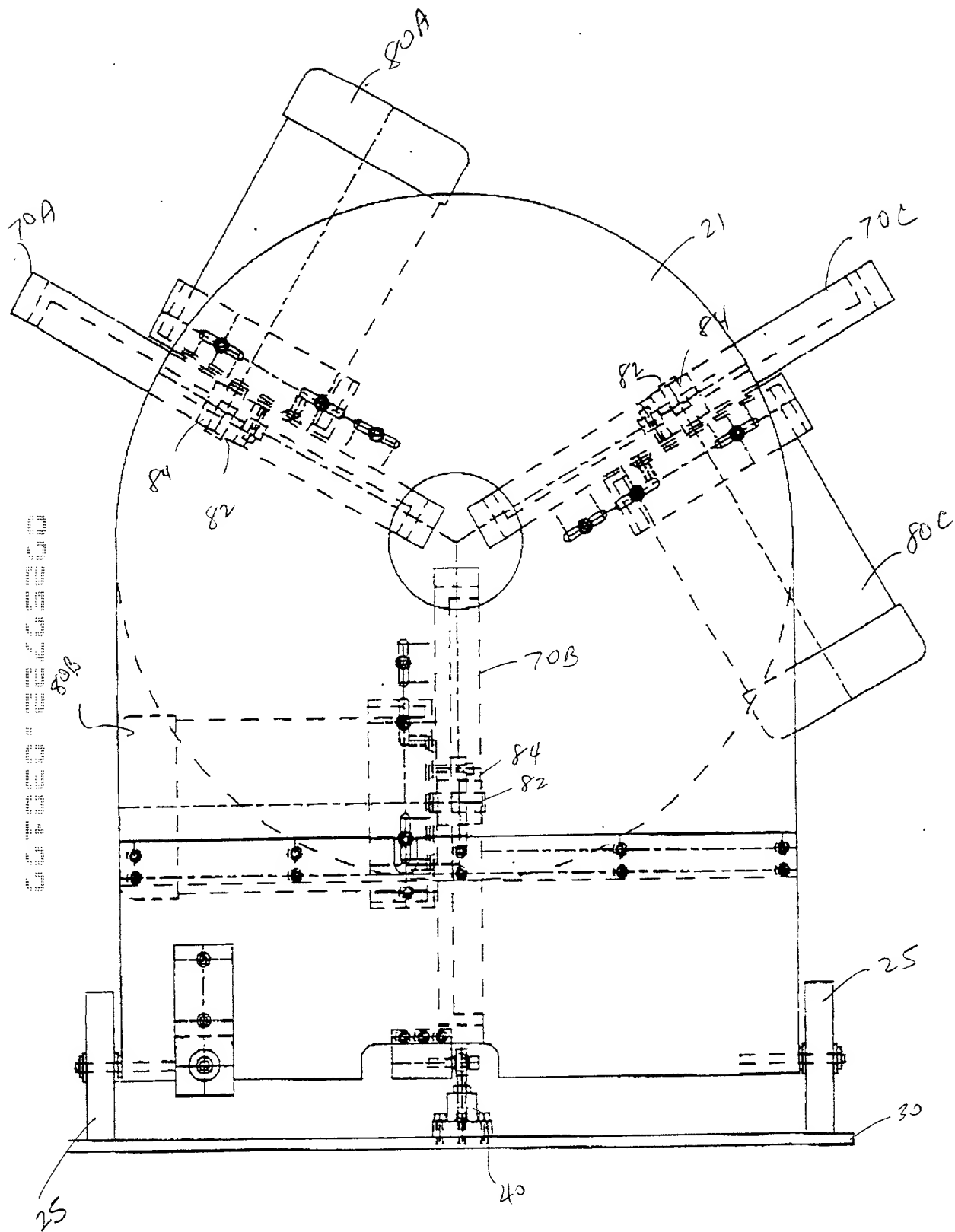


FIG 2

FIG. 3 is a perspective view of the device of FIG. 1, showing the device in a closed position.

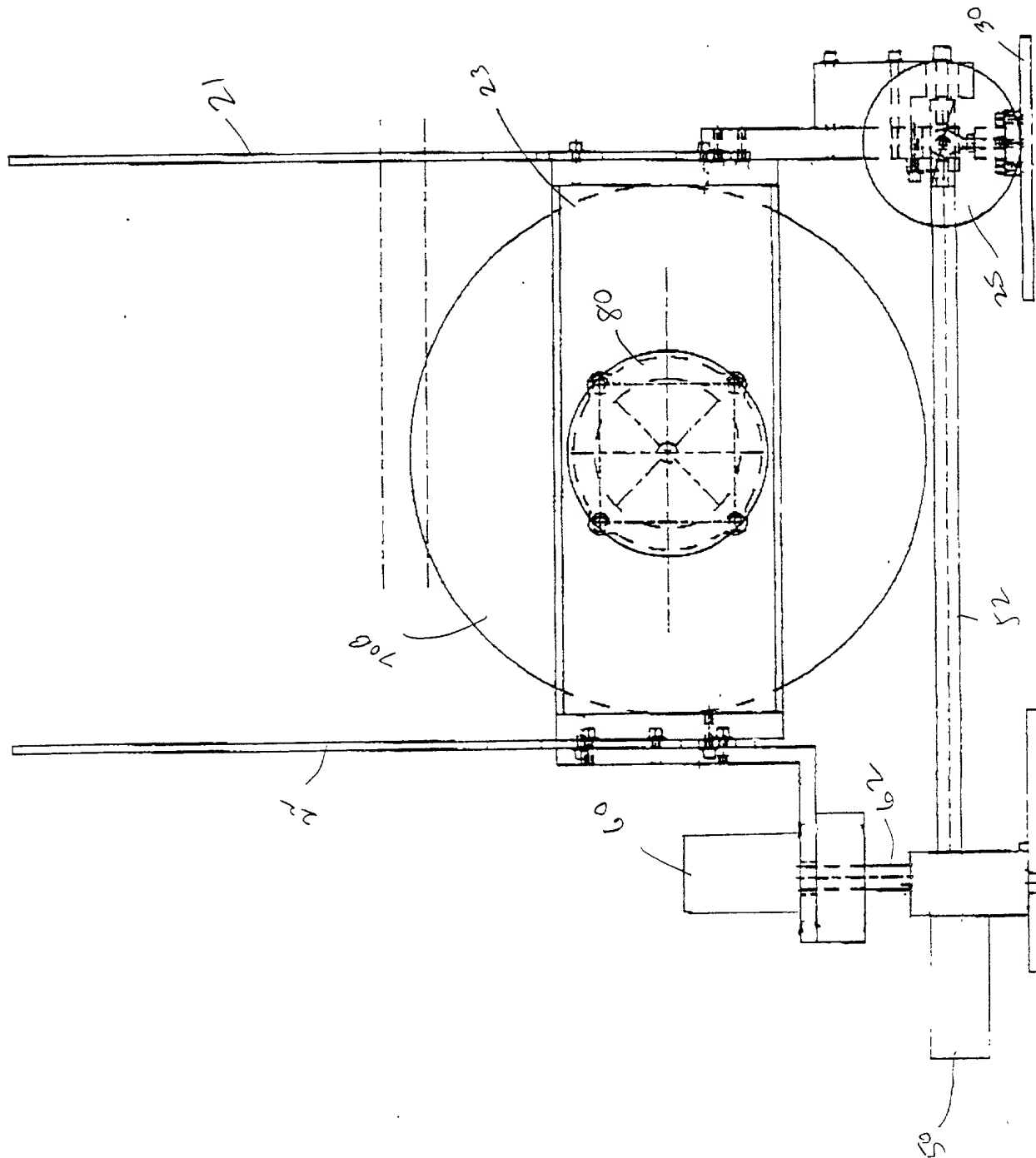


FIG. 3

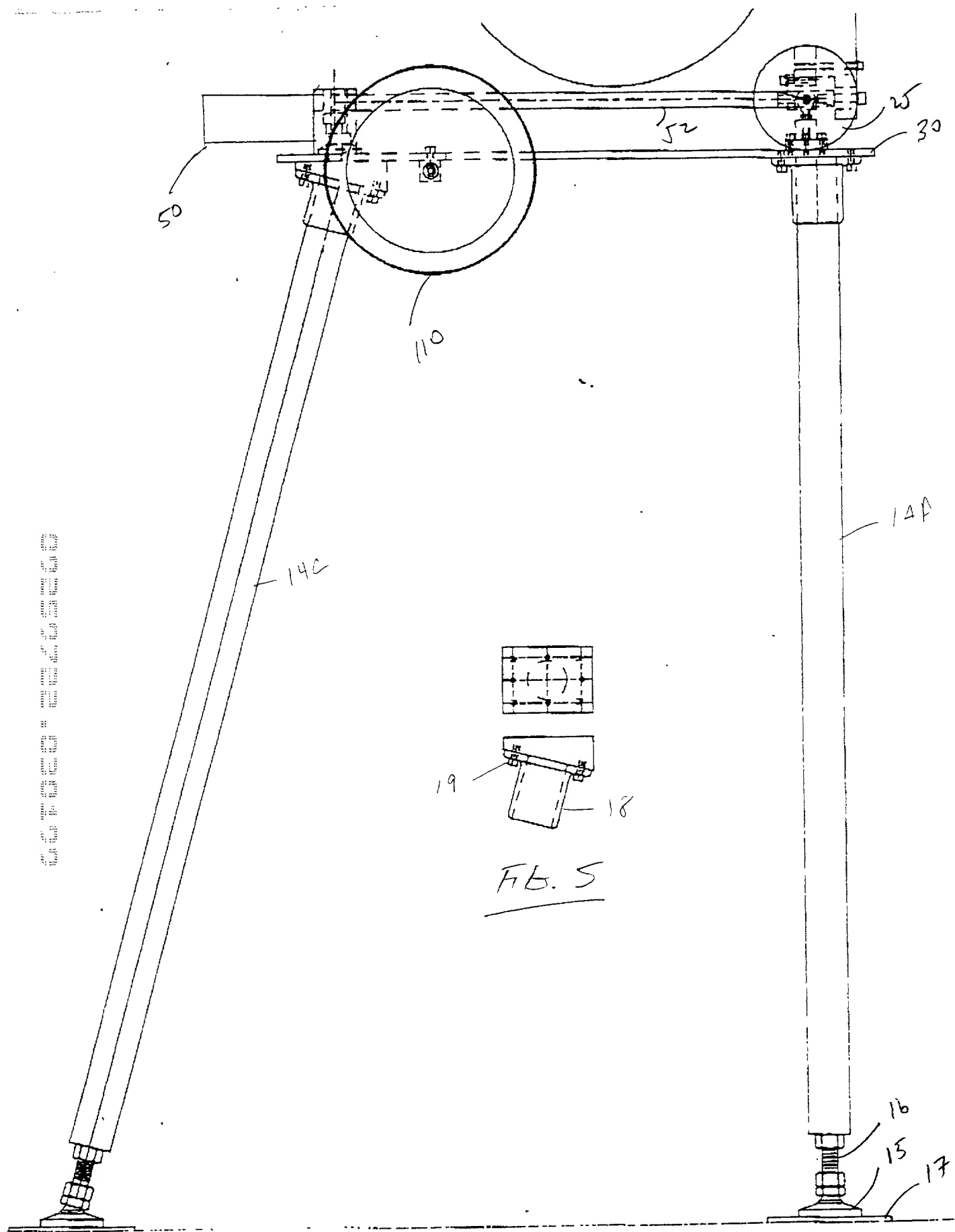
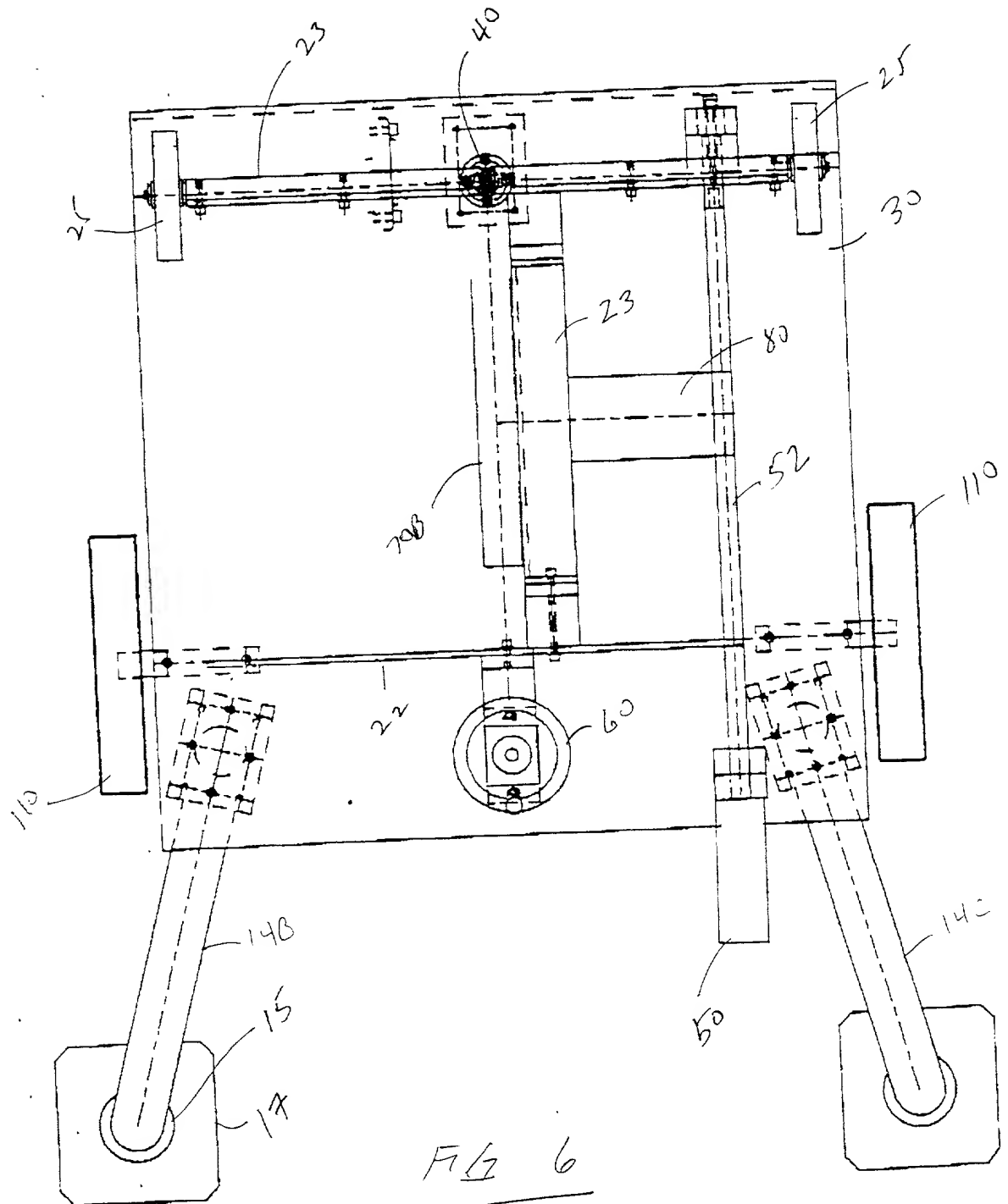
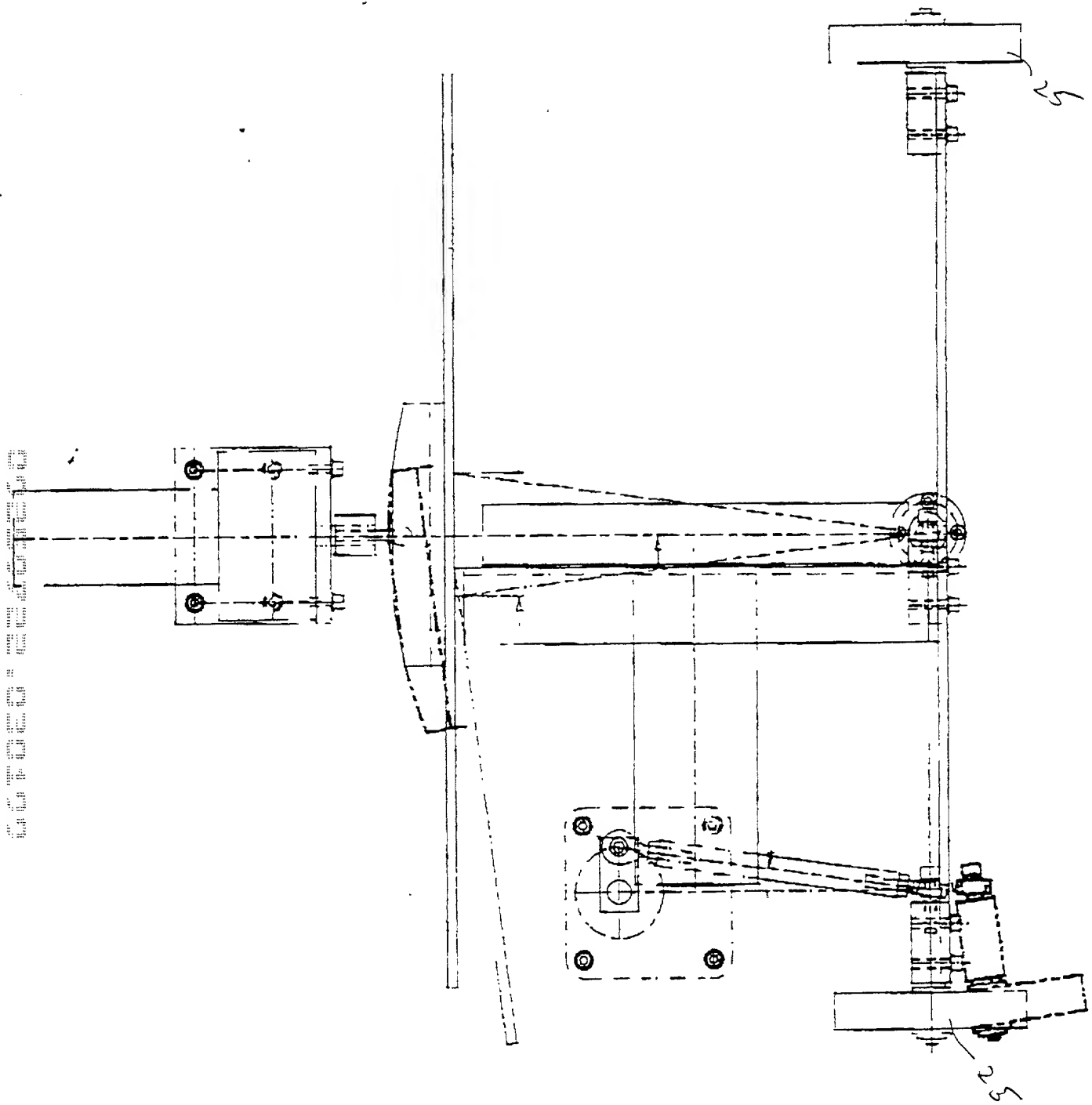


FIG. 4.

FIG. 5

FIG. 6 is a perspective view of the device of FIG. 1, showing the device in a retracted position.





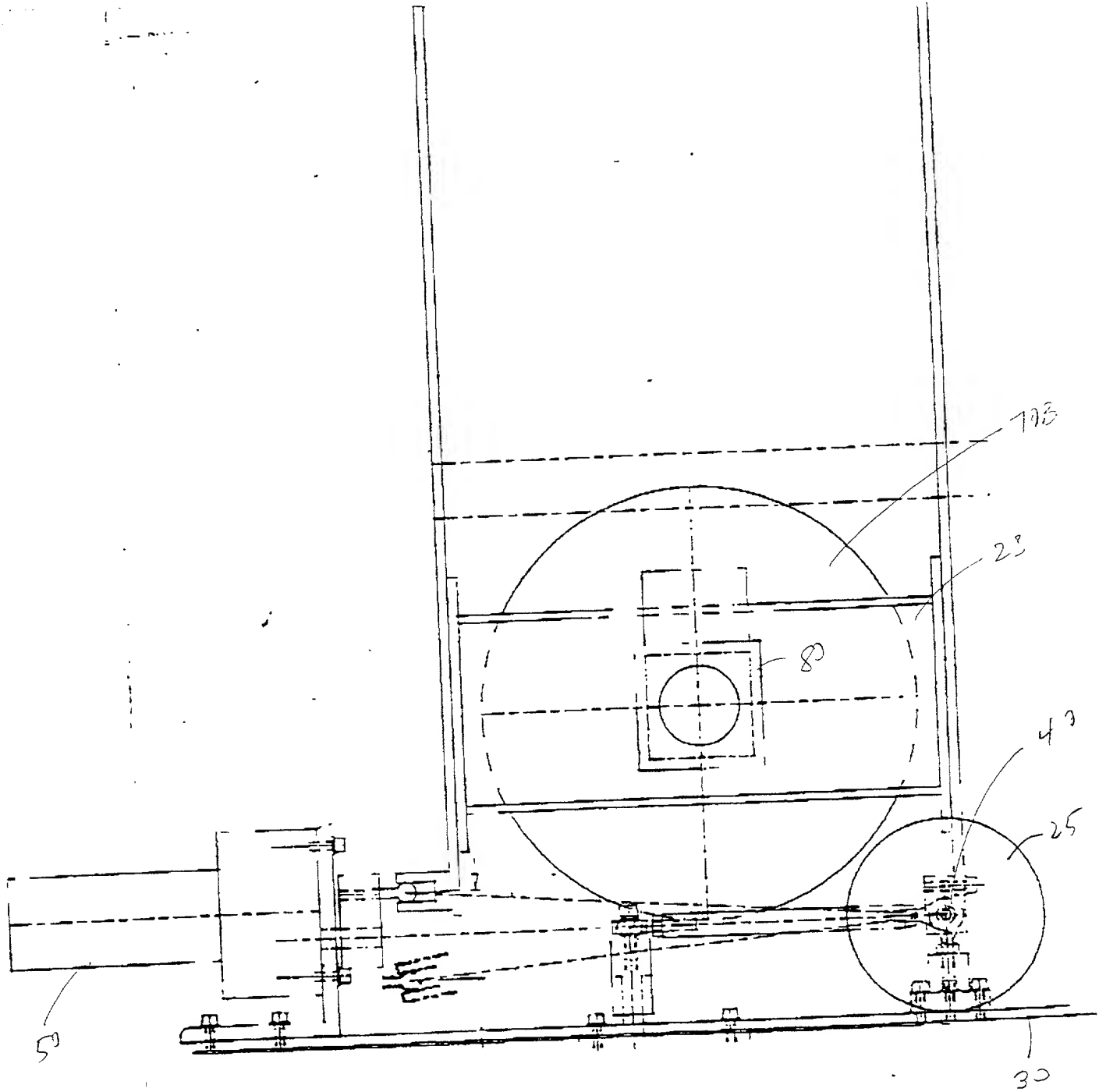


FIG. 8

FIG. 9 is a schematic diagram of the system of the present invention, showing the arrangement of the various components and the flow of data between them.

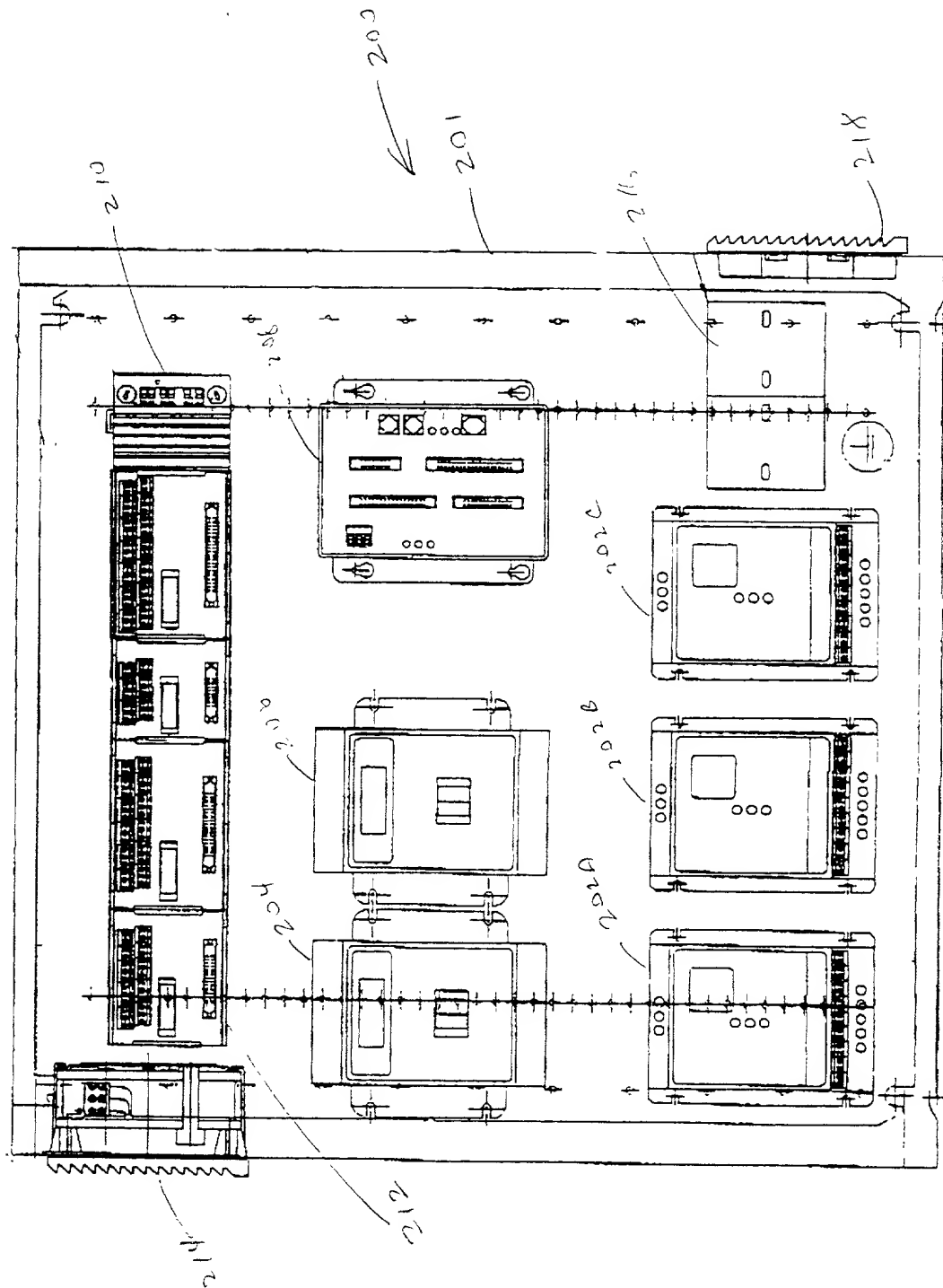
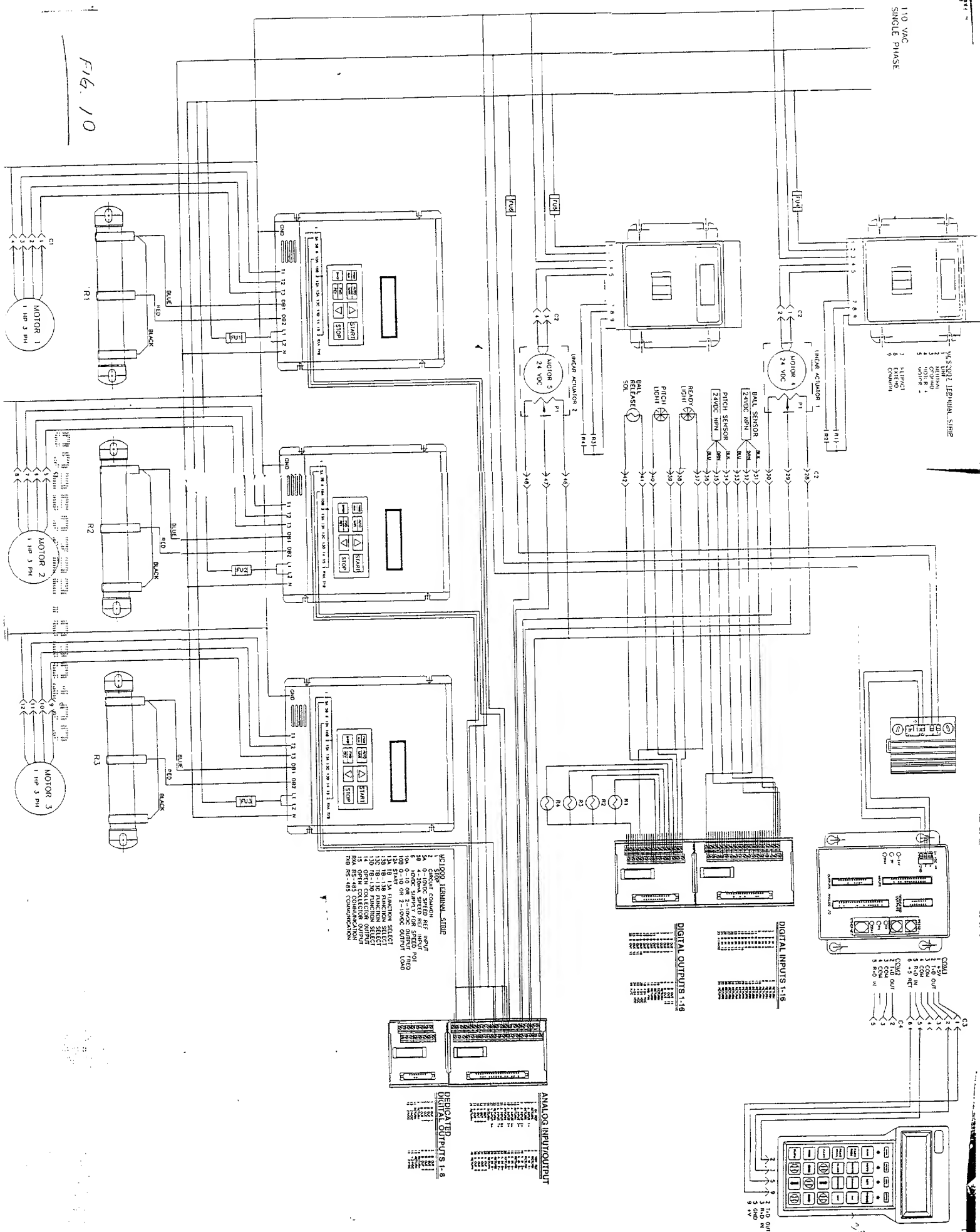


FIG. 9



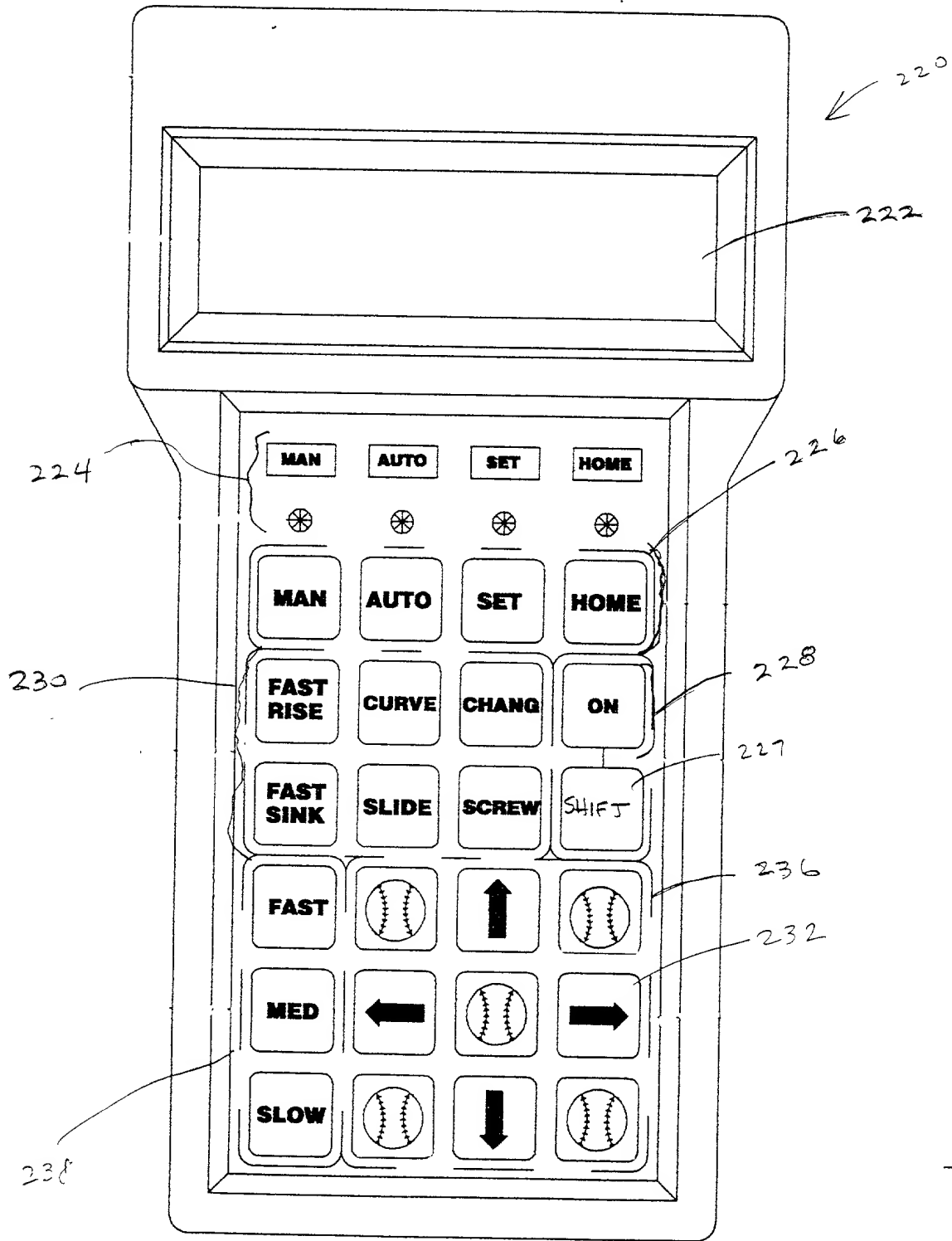


FIG 11

DECLARATION AND POWER OF ATTORNEY

Docket No.: RUS013USU

As below-named inventors, we hereby declare that:

Our residence, post office address and citizenship are as stated below next to our names;

We believe that we are the original, first and sole inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled:

BALL-THROWING MACHINE

the specification of which is attached hereto.

We hereby state that we have reviewed and understand the content of the above-identified specification, including the claims.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations Sec. 1.56(a) which states as follows:

“(a) A duty of candor, and good faith toward the Patent and Trademark Office rests on the inventor, on each attorney or agent who prepares or prosecutes the application and on every other individual who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application. All such individuals have a duty to disclose to the Office information they are aware of which is material to the examination of the application. Such information is material where there is substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent. The duty is commensurate with the degree of involvement in the preparation or prosecution of the application;”

and, we acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations Sec. 1.63(d).

We hereby claim foreign priority benefits under Title 35, United States Code, Sec. 119 of any foreign application(s) for patent or inventor certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Claimed

NONE

(Number)

(Country)

(Day/Mon/Yr Filed)

Yes No

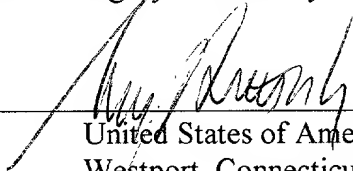
We hereby claim the benefit under Title 35, United States Code, Sec. 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claim(s) of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Sec. 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Sec. 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

NONE

(Appln. S/N)	(Filing Date)	(patented, pending etc.)
(Appln. S/N)	(Filing Date)	(patented, pending etc.)

Full name of first inventor: Gregory J. Battersby

Inventor's signature



Date

Feb 25, 1999

Citizen:

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Residence:

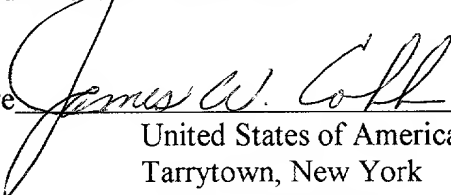
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Full name of second inventor: James Cobb

Inventor's signature



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Citizen:

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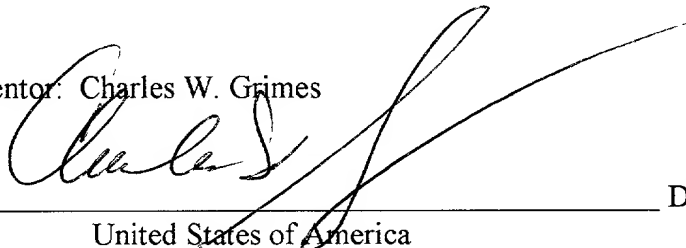
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Full name of third inventor: Charles W. Grimes

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Full name of fourth inventor: Richard D. Schile, PhD

Inventor's signature Richard D. Schile Date Feb. 23, 1999
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Full name of fifth inventor: Steve Van Geldern

Inventor's signature Steve Van Geldern Date 3/1/99
Citizen: United States of America
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POWER OF ATTORNEY

As named inventor, we hereby appoint the following attorneys to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected therewith:

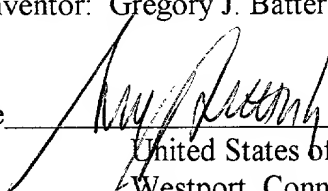
James G. Coplit, Esq.	Reg. No. 40,571
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Charles W. Grimes, Esq.	Reg. No. 27,791

Send all correspondence and direct all telephone calls to:

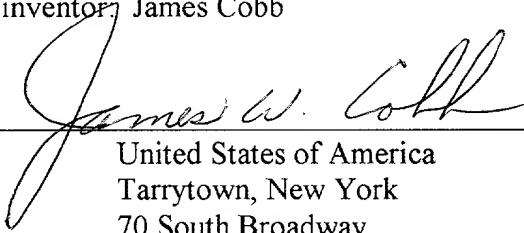
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We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Sec. 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor: Gregory J. Battersby

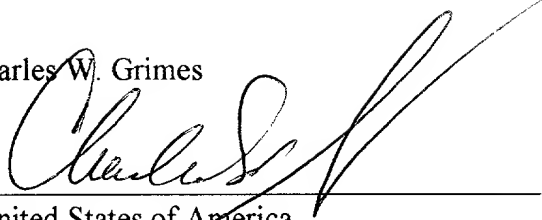
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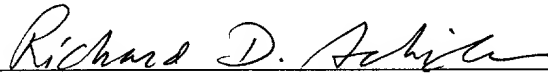
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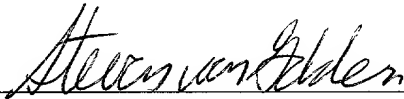
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